BBC · MASTER · ELECTRON · ARCHIMEDES MARCH 1989 £1·40

BBC ACORN USER

WORDWISE PLUS:
Strip down your programs for speed

ARC HODGEPODGE:



See it grow in living colour

ANNUAL REPORT:
Big software for small businesses

DIY CASTLES:
Design, print, cut out and keep

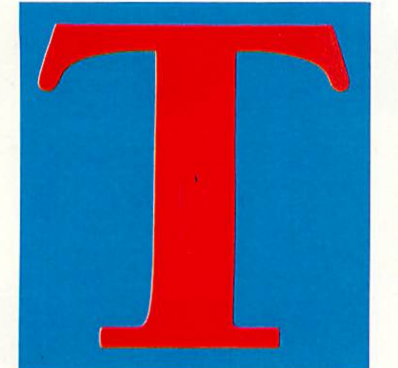
RAM STAR

Jukebox tricks in sideways RAM

COMPETITION:
Win an Archimedes from Watford



R · M ▶ N · I · M · B · U · S



he class of '88



In 1988 RM became the top microcomputer network supplier in education. By now, literally thousands of Nimbus Networks have been installed and set to work in schools and colleges all over the country. Here are some extracts from the end-of-year report:

Networking. RM are the champions, leading in both hardware performance and software availability. RM's continuing improvement has stood them in good stead in other subjects too...

Control. With an RM Network, the teacher can easily ensure that the very best software is equally available from the central server to all pupils – yet still allow each pupil to progress at his or her own speed.

Ease of Use. The sophisticated graphics that come with all Nimbus systems means that everyone – even the youngest – can work in a user-friendly environment with pull-down menus, icons, and a mouse. And lots of colourful, specially-designed software.

Budget. An RM network lets everyone share hard discs and printers, and get maximum use out of the investment. Then there's the software; not only is it made for sharing – every network includes a spectacular library of valuable software that gets the system off to a flying start, giving pupils a firm base of applications programs they can use in all subjects.

No wonder RM are acclaimed by pupils and teachers alike.

RM
RESEARCH MACHINES

Contact us either at Oxford on 0865-791234 or Stockport on 061-477 1538, or write to Research Machines, Mill Street, Oxford OX2 0BW.

THE · EDUCATED · DECISION

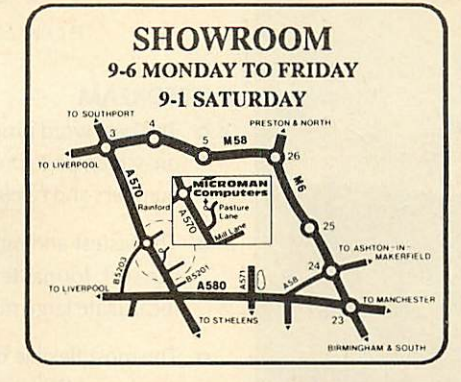
NEW PRICES

MICROMAN Computers

PASTURE LANE FARM,
PASTURE LANE, RAINFORD,
ST HELENS, MERSEYSIDE, WA11 8PU
PHONE 074488 3667

SHOWROOM

9-6 MONDAY TO FRIDAY
9-1 SATURDAY



MAIL ORDER

PHONE 074488 5242

Delivery Charges

Large Items
NEXT DAY CARRIER £9.00
Small Items
POST £1.00



All Prices Exclude VAT

Please add 15% VAT

ACORN PREMIER DEALER : ECONET : SERVICE CENTRE

ARCHIMEDES 300 SERIES	
Archimedes 310 Base	725.00
Archimedes 310 Mono	775.00
Archimedes 310 Colour	925.00
Archimedes 310M Base	775.00
Archimedes 310M Mono	825.00
Archimedes 310M Colour	975.00

ARCHIMEDES 400 SERIES	
Archimedes 440 Base	2225.00
Archimedes 440 Mono	2275.00
Archimedes 440 Colour	2395.00

MULTISYNC MONITORS	
NEC Multisync 2	459.00
Taxan 770 Plus Multisync	499.00

ARCHIMEDES UPGRADES	
RISC OS - Available April 89	29.00
0.5 MB RAM (305 only) *	149.00
Floppy Disc Drive *	115.00
Acorn 20MB Hard Disc *	499.00

* Dealer Upgrade only

ARCHIMEDES EXPANSION CARDS	
Acorn Backplane Podule	37.00
Atomwide 4 Way Backplane	53.00
Computer Concepts ROM Podule	49.00
As above + Battery Backup	59.00
Acorn I/O Podule	79.00
Acorn MIDI Add-on to I/O	37.00
Acorn MIDI Expansion Card	65.00
IEEE 488 - Intelligent Interfaces	275.00

WATFORD PRODUCTS	
5.25/3.5 Disc Interface	19.00
Archimedes - BBC Serial Link	25.00
Archimedes Real-Time Digitiser	249.00

ARCHIMEDES LANGUAGES	
Ansi C	89.00
ISO-Pascal	89.00
FORTRAN 77	89.00
Software Developers Toolbox	179.00
Assembler	179.00
Prolog X	179.00
LISP	179.00
Twin	26.00
Logotron Logo	60.00
Archimedes BASIC Compiler	78.00

ACORN SOFTWARE	
PC Emulator	89.00
1st Word Plus	69.00
Logistix	89.00
Acorn DTP - Available April 89	TBA

SOUND/SYNTH PRODUCTS	
EMR Achimedes Sound Synth	41.00
EMR Creations Disk	16.00
EMR Studio 24 Plus	82.00
EMR MIDI Board	66.00
Armadillo Mono Sound Sampler	128.00
Armadillo Stero Sound Sampler	166.00
Armadillo Fourier 'Spectre' Software	57.00

CAD/DESIGN SOFTWARE	
Autosketch	69.00
Euclid	37.00
ARC-PCB	159.00
Realtime Solids Modeller	74.00
Super Dump	21.00
Oak Professional PDT	299.00

COLTON SOFTWARE	
Pipedream	89.00

CLARES SOFTWARE	
Clares Artisan	31.00
Clares Artisan Utilities	16.00
Clares Pro-Artisan	133.00
Clares Render Bender - January 89	63.00
Clares AlphaBase	39.00
Clares Graphic Writer	23.00

MINERVA SOFTWARE	
Sigma Spreadsheet	55.00
Minerva Deltabase	23.00
Minerva System Delta Plus	55.00
Minerva Gamma Plot	55.00

MISC APPLICATIONS SOFTWARE	
Flying Start	63.00
U Connect	47.00
Signwriter (Large Text Fonts)	39.00

BBC MASTER SERIES	
Master 128	359.00

PHILIPS CM8533
Medium Resolution Monitor
SPECIAL PRICE
£179.00

PHILIPS MONITORS	
Philips CM8833 Med/RGB/CV	225.00
Philips Green 7502	73.00

BBC B/B+ UPGRADES	
Acorn 1770 Disc Interface	49.00
Acorn ADFS ROM	26.08
Acorn DNFS ROM	17.91

BBC 5.25" DISC DRIVES	
Single 400K 40/80T	95.00
Single 400K 40/80T + PSU	109.00
Dual 800K 40/80T	189.00
Dual 800K 40/80T + PSU	209.00

WATFORD BBC PRODUCTS	
Watford Solderless ROM Board	32.00
Watford 32K ROM/RAM Card	48.00
Watford 32K Shadow RAM Board	59.00
Watford BEEB Video Digitiser	109.00
Watford Magazine Maker	135.00
Watford Quest Mouse	25.00
Watford Quest Mouse + Paint	54.00

CONCEPT KEYBOARDS	
Concept Keyboard A4	115.00
Concept Keyboard A3	146.50

Primary & Secondary Versions Available

AMX PRODUCTS	
AMX Mouse + Super Art *	63.00
AMX Mouse + Stop Press *	63.00
AMX Super Art ROM *	39.00
AMX Stop Press *	39.00
AMX Extra Extra	20.00

* Master or BBC/B+ Version Available

CAMBRIDGE Z88 COMPUTER	
Z88 Computer	239.00
Z88 Computer SPECIAL PACK	299.95

ROLAND A3 PLOTTERS	
Roland DXY880A Plotter	545.00
Roland DXY1100 Plotter	629.00
Roland DXY1200 Plotter	869.00
Roland DXY1300 Plotter	1029.00

PRINTERS SPECIAL PRICES

Panasonic KXP 1081
£139.00
Star LC-10
£165.00
Star LC-10 Colour
£209.00
Star LC24-10
£269.00
Epson LX800
£179.00

Includes Free BBC/Archimedes Printer Cable

GOVERNMENT, NHS AND EDUCATIONAL ORDERS ACCEPTED

WIN £1000 ARCHIMEDES – SEE PAGE 79

BBC ACORN USER

ISSUE NO 80 MARCH 1989

COVER



COVER FEATURE
Sideways RAM made easy, pages 66-71

Cover by Andrew MacConville

EDITORIAL

It is clear that there isn't any 16- or 32-bit micro that meets the needs of education quite as well as the BBC Master.

The various contenders, Arc, Nimbus, Amiga, Macintosh, ST and IBM PCs, all have their strengths and weaknesses, and they've all been tested by the National Council for Educational Technology. Its conclusions are currently held by the Government – depriving teachers of the advice they need about buying new micros.

The NCET is reported to have concluded that emulator software allowing each micro to run existing BBC micro educational software isn't the right approach – yet last year the DES effectively told manufacturers that an emulator was vital.

Most manufacturers have spent vast sums of money developing emulators. Is it possible that the DES is holding up the report because it's embarrassed?

NEWS

Half price Unix 7
DES sits on NCET report, BBC puts applications first

CUSTOMER HOTLINE 10

COMMS COLUMN 13

EDUCATION NEWS 15

PREVIEW 17
ProArtisan from Clares, an interactive video from Virgin, *Labelwriter* from Wight Scientific and a KX119 monochrome monitor from Taxan

NOTICEBOARD 18

READER SERVICE 18

BLUNDERBOX 18

FEATURES

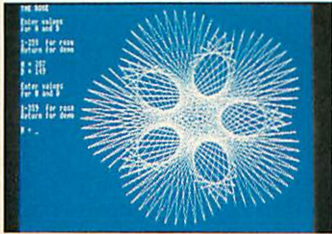
JUKEBOX TUTORS 66
Easier program writing with sideways RAM. Plus David Harper gives you an example for *Wordwise Plus*

WORDWISE MINUS 73
Chris Robbins looks at the programming language of *Wordwise Plus* and shows how to lose space in order to speed it up

BEST OF LIFE 78
Life could be better! When you see our beautiful Hodgepodge pictures, you too will think so. Andrew Green tells us how

THE FULL ACCOUNT 81
Roger Carus looks at the business software market and discovers there are few new products

NAME OF THE ROSE 87



A beautiful Spirograph-like program from Steve MacGuire. Create your own designs

REVIEWS

GAMES PAGE 121
Sam Greenhill reviews the latest, including a sports package from Superior Software

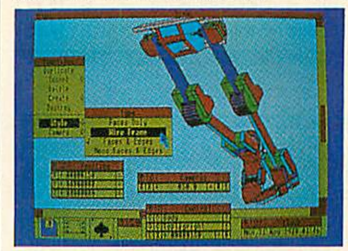
DESIGNER CASTLES 89
And now for something completely different! Chris Drage and Nick Evans were impressed with Data Design's latest software for education

GAMES REVIEWS 123
Superior's *A Question of Sport* and for the Archimedes *Repton 3* from Superior Software and *Pacmania* from Grandslam have been put through their paces

NUMBERING UP 125
Two packages useful for teaching maths get the thumbs up from Martin Phillips – *Numerator* from Logotron and *Geometrix*, the first package from European Educational Software

GETTING IT WET 129
Dave Futcher tries his hand at running a water authority

OUT OF THE SHADOW 130



Sam and Richard Greenhill look at Ace Computing's Archimedes solid modeller *Euclid* and describe how it's helping them build a humanoid robot

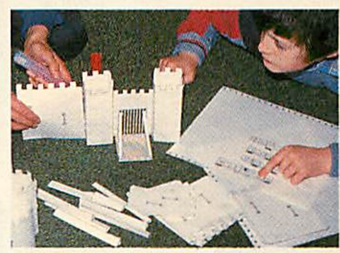
GOOD CONNECTIONS 133
The Amstrad SM2400 modem appears attractive to Acorn users. But Dr Christopher Dobbing found it quite difficult to actually get started

FILE THROUGH 137
Dave Lawrence examines *Advanced File Manager* from Pres and finds that it's good but could be a lot better

EDUCATION

NEWS 15
NCET Report withheld

DESIGNER CASTLES 89



Data Design's software is a good introduction to school history, as well as a resource for CDT teaching. And it's great fun at home too

REGULARS

HINTS AND TIPS 41
David Atherton with a Cut and Paste ROM and some tips for Master 512 users

ARC AGORA 46
David Acton shows you how you can archive your hard discs. There's also a module for finding path-names

YELLOW PAGES 97

LETTERS 138

FREE ADS 143

ADVERTISERS' INDEX 143

ACORN ABUSERS' DIARY 144

READER OFFERS 76,92,134

NEXT MONTH



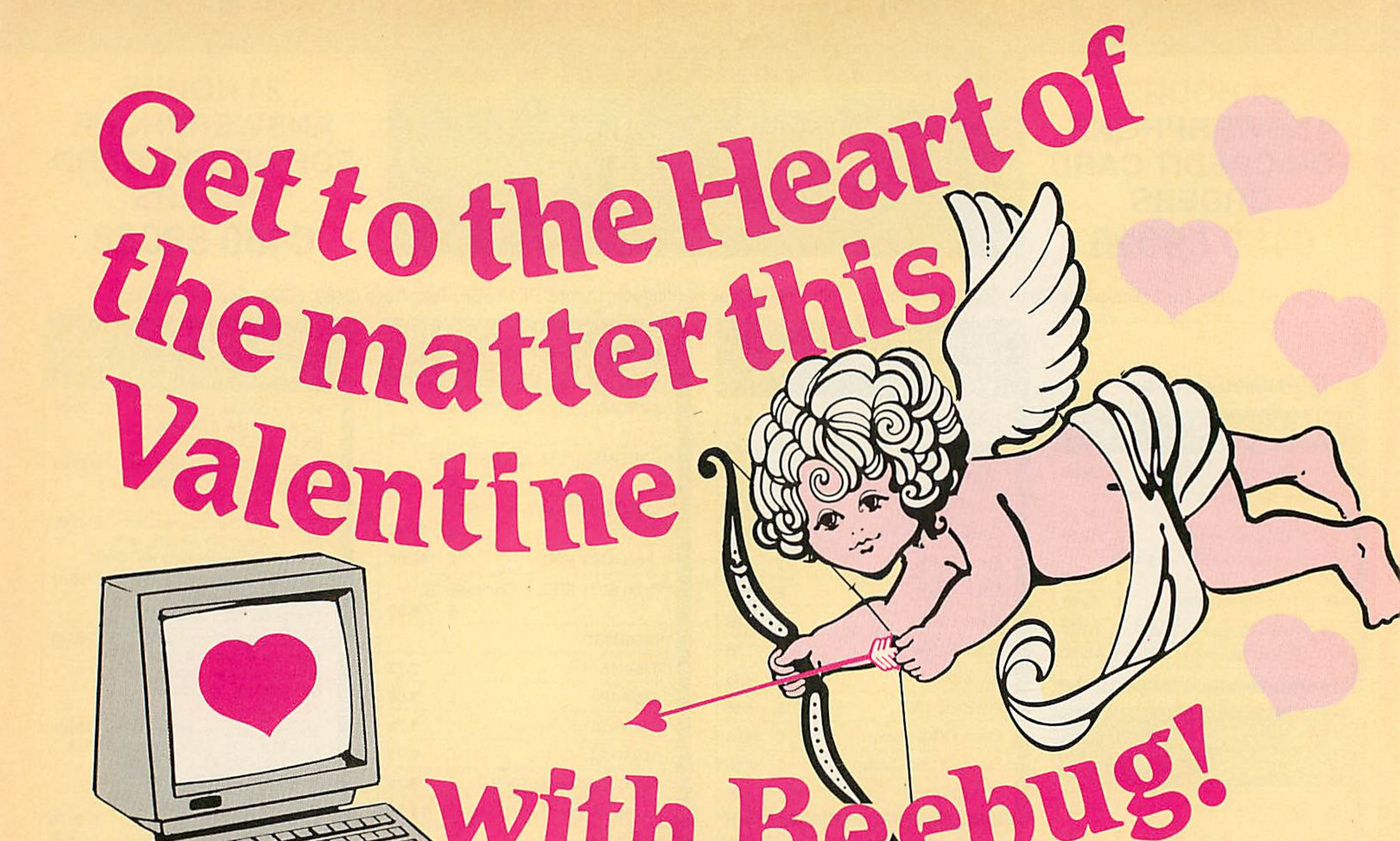
Codename Druid, a super type-in game, plus more on business, multi-columns in *View*, font software and a little Smalltalk on the Archimedes



Editor Graham Bell. **Technical Editor** Robert Miller. **Editorial Assistant** Christina Neal. **Sub-Editor** Pauline McLernon. **Production Assistant** Sally-Ann Sweeney. **Art Director** Ian Findlay. **Art Editor** Paul Holmes. **Art Assistant** Danny Luckett. **Ad Manager** Roger Mullins. **Deputy Ad Manager** Perry Hodder. **Sales Executive** Richard Power. **Ad Production** David Noakes. **Publishing Services Executive** Seran Anderson Haddick. **Group Editor** Tony Quinn. **Managing Editor** Ellen Brush. **Publisher** Seamus Geoghegan **Publishing Director** Michael Potter. **Editorial Director** Christopher Ward.

ABC

Published by Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. Tel: 01-490 1444. Telecom Gold 81: RED001. Micronet 919992492. Printed by Riverside Press, Gillingham. Typeset by Ician Communications Group, Harlow. Colour by Trumps Studio, Ware, Herts. Print production by Aquarius Print and Design, London. Distributed by BBC Magazines, 35 Marylebone High Street, London W1. ISSN 0263 7456


Get to the Heart of the matter this Valentine
with Beebug!

NEWS

Schools must wait for micro report

A report by the National Council for Educational Technology is being sat on by the Department of Education and Science. Meanwhile teachers, whom the report was supposed to help, struggle to choose between the huge range of computers which are offered by manufacturers that are currently fighting over the education market.

The NCET tested 12 machines, both for the features recommended in guidelines issued by the DES in 1987 and for compatibility with existing hardware in schools – the Master 128 and Research Machines' Nimbus.

Compatibility with various networks commonly used in schools including Econet and Nimbus Net, was also tested.

The NCET had originally planned to release its findings at the turn of the year, and it is now anxious to make the results of the survey known to the public.

The first months of the year are a peak buying time in education; BETT, the major exhibition, is held in January, and the end of the financial year is in April. Education authorities are being deprived of advice at the time when they most need it.

Ecology on the Arc

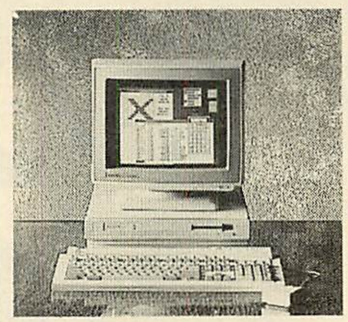
Innocent Software has compiled versions of three of BBC Soft's existing educational programs for the Arc. *Ecology and Conservation*, *Relationships* and *Food and Population* all come from the Science Topics series. The price of each package is £29.95.

Half-price Unix

Acorn has announced prices and configurations for the R140, its Unix workstation revealed last month in *BBC Acorn User*.

The most basic system costs £4025, but it lacks a monitor and Ethernet interface. You do get a full 'Archimedes 440-like machine' with 4Mb of RAM, a 50Mb hard disc, and a year's on-site maintenance.

For £4541, you also get the 'Thick wire' and 'Thin wire' Ethernet connections to connect the R140 to other Unix machines, plus the Arcs' MS-DOS emulator. You can add a normal mono monitor, a multisync unit, or a high-resolution 1152-by-900 pixel mono monitor.



The hard disc contains the Acorn version of the Unix operating system, known as Risc iX, which is a full version of Berkeley Unix release 4.3, plus System V kernel extensions, Sun NFS, TCP/IP standardised networking and Xii windows compatibility. As reported in December 1988's *Acorn User*, IXI's *X-Desktop* is also included to give an easier-to-learn face to unfriendly Unix for first-time users. The machine can also run all Archimedes Risc OS software.

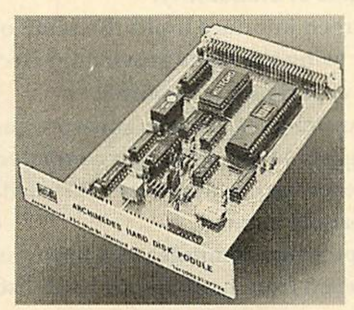
Two vital add-ons are due to be released by summer – a Small Computer System Interface (SCSI) podule to allow you to add extra hard discs or other devices, and the long-awaited hardware floating point card which is based on the WD32206 maths chip.

Acorn has recruited more marketing staff to sell its new Unix workstation in higher education. New industry marketing manager Warwick Hirst was marketing manager for Torch, and specialised in selling Unix systems based on Torch Triple X and Quad X machines to both government and industry.

Frank Burdett, higher education adviser, joins from Bath University where he used to lecture in geography. With a doctorate on computers in education he is well-placed to offer advice.

Arc hard discs

Watford has come up with a cheaper Winchester disc upgrade for the Archimedes 310. For £436 you get the interface podule and a 20Mb hard disc unit – and it's compatible with Acorn's own £573 version of the upgrade.



Watford's cheaper Arc upgrade

To fit the hard disc, you'll need a backplane. There are two Watford versions, for two or four podules, at £29 and £44. And add another £10 for the fan – you'll find it gets pretty hot without it if you fit a full complement of podules. A fan is necessary if your machine is still under guarantee.

Acorn ARM chip gets a boost

This year will see Acorn's ARM chip powering a range of computers and peripherals from other manufactuers. VLSI Technology, which makes the chips for the Arc in Temple, Arizona, knows of about 20 computer companies designing products using the chip.

VLSI's Jim Farrell said: 'We expect a large computer company to make an announcement at the Spring Comdex fair in May. About four companies could make announcements.' He refused to divulge further details, but stressed that the products would go beyond the embedded applications like laser printer controllers which are expected. And Sanyo, which also makes ARM chips, is known to be close to announcing products based around its particular version.

The chip's commercial prospects outside of Acorn have been boosted by the publication of a technical manual about it, which is available from specialist booksellers and VLSI itself.

What you see is what you get



Transfolink, packaged in a black briefcase, comprises all the leads and software you need for transferring files between the IBM PC/AT & compatibles, the BBC MICRO, and the ATARI ST.
Transfolink will shortly be available for APPLE MACINTOSH, COMMODORE AMIGA and CAMBRIDGE Z88 COMPUTERS.
Please phone for details of availability.

The philosophy is simple. Run the program; the screen interface looks the same on every machine (so it's easy to learn). Connect the machines together using the leads provided. Select a file and send it! No further knowledge or experience is required.

Transfolink is designed to provide all the file transfer components; software and leads in one easy to use package. Transfolink, as its name suggests simply links two computers together and transfers your files. Now you can cross the manufacturer barrier with ease. Instructions are presented in a filofax compatible manual.

Transfer files from a laptop to a desktop machine, from a personal computer to a business computer, between any combination of hard discs, floppy discs and RAM drives, or even from hard disc to hard disc (backing-up made easy!).

- Will simply and easily link any two supported microcomputers
- Does not require any boards or modification to the microcomputers
- Single screen operation with minimum of user intervention
- Prompting for rename/overwrite of existing files
- Prompting for rename of read-only files
- Prompting for change of disc if no free space for file
- Histogram indication of data transfer process
- High speed multiple file data transfer
- Robust communications protocol utilising CRC algorithms
- Utilises industry standard RS-232C or compatible serial interface
- Fully automatic retries on detected data errors
- Automatic connection and link verification on startup
- Universal polarised connecting coupler
- Comprehensive filofax compatible user manual
- On-line pop-up information windows and help



TRANSFOLINK, SILICON CROFT, P.O. BOX 1258 BIRMINGHAM B13 8NU
For technical enquiries telephone 021·442 4042 FAX 021·449 1822

NEWS IN BRIEF

■ Computers play a large part in the therapy and education of the physically handicapped, but their role in helping the mentally handicapped and in the rehabilitation of the mentally ill receives less publicity. To redress this the Westminster Association for Mental Health has organised a seminar 'Computers and Mental Health: from therapy to employment', on behalf of the Mental Health Foundation. The seminar will be held on February 21 at the King's Fund Centre in Camden, North London.

■ Technology-conscious Feltham Community School is holding its annual exhibition, Technology 2001, on March 2 this year. Last year a wide range of companies including giants such as British Petroleum and Honeywell Bull attended and demonstrated their products and use of information technology to pupils and parents, and the school hopes to attract the same range of companies this year.

■ Busy Arc owners can now keep their dates intact with a new desktop diary, £9.95, from Quercus Computer Systems. Its *QCS Diary* is fully compatible with standard desktop files but also offers full screen over-view, a part screen for each day, and can create files for the years ahead. Files can be printed out on a wide range of printers as the Quercus package includes a printer driver generator.

■ Human Computer Interface is offering discounts for schools and education centres on BBC connectivity products. The Cambridge-based firm has reduced its prices on the *View to Mac* version 2 from £59 to £47.20 each for orders exceeding 10 copies. Similar discounts are available on products such as *Screen to Mac* and serial transfer cables.

BBC puts programs first on television

The BBC is renewing its commitment to computing with a two-hour special to be broadcast on BBC1 on Sunday April 2. The programme is provisionally titled *Micro File,* and its three presenters have yet to be chosen, but producer Bryn Brooks intends to fill the show with examples of all the ways in which computers can be fun and useful.

'It's meant to be a review of computer software, presented in a totally non-technical way to people of all ages who maybe have access to a computer at home but aren't experts,' Brooks explained.

'We want to show that you can do much more than word processing and playing games.

As much software as possible will be shown on six different machines, the original BBC, the Archimedes, the Amstrad (representing IBM-compatibles), Nimbus, Atari and Commodore Amiga.

The programme's titles and music will be produced by non-experts and children using basic drawing and design programs and the *Hybrid Music System*.



Hardware, experts and programming banished in new approach

The often boring subjects of databases and spreadsheets will be made interesting by analysing data collected using the BBC's own *Birdspy* program as part of the RSPB's worldwide birdwatch in January. This will be compared with the RSPB's own data on birdlife in Britain, and the team will navigate from the BBC to the RSPB in Sandy and back using the *Autoroute* road-finding program and a lap-top computer.

Several teams will use desktop publishing software to compile and publish news of the day's activities. Other groups will be designing castles, planning and building fairgrounds with *Control Logo*, and using computers to research their family history with the help of newsreader Gordon Honeycombe. A follow-up programme screened at 11pm will show the results of activities during the day.

Boost for Hypertext

Logotron has released a new catalogue of educational software for 1989.

The catalogue highlights new products, including maths program *Numerator* (the Master 128 version is reviewed by Martin Phillips in this issue) and *Hyperbook*, which enables users to create indices, glossaries and cross-referencing for books and documents and allows you to jump rapidly from text items to related areas of the document.

Both programs are available for the Archimedes in line with Logotron's new policy of supporting the newer, more powerful micros in schools.

Hyperbook is a joint venture with book and software publisher Longmans, and several texts for use with the program are being published to coincide with the launch of the *Hyperbook* package – including *Hamlet*, the Gospels and the Acts of the Apostles, and the Educational Reform Act. Prices for these texts will range between £10 and £25 with the *Hyperbook* program itself costing £56.35.

Drawing on animation

Silicon Vision has released two more technical programs for the Archimedes and BBC computers. *Realtime Solids Modeller* is available only for the former, at £89.95, and is aimed at both educational and professional users in CDT, engineering and architecture.

SolidCAD, available for both machines at £49.95, is a 3D drafting program; BBC users can transfer designs to the same company's *Real-time Graphics Language* program on the BBC model B.

CD jukebox masters hits

Arbiter Leisure's Discmaster CD jukebox may look as if it's just dropped in from outer space, but the components inside will be quite familiar to BBC users. The thousand or so tracks on the 60 CDs inside are controlled and selected by a computer. There's a Master 128 hidden inside the mushroom-shaped box.

'With CD jukeboxes there are so many titles to display that you can't do it with paper cards like old-fashioned jukeboxes,' explained Joanne Arbiter of Arbiter Leisure, designers of the Discmaster. So in the centre of the unit's circular top, designed to look like a compact disc, is a screen displaying a scrolling list of titles, and touch sensitive keys for customers to make their choice of tracks.

'People put money in jukeboxes just to play with them like toys, as much as they do to hear the music, so the computer makes it fun. And the Discmaster's design is more interesting than other recent models,' said Arbiter.

You can test the Discmaster jukebox in around 700 pubs across the country and in the CD department of Tower Records in London.

A London housewife was spared the expense of buying herself a home computer by winning an Archimedes. Theresa Elliot was the first out of the hat in the Great Monument Grand Draw, organised by the Muscular Dystrophy Group. The Acorn-donated prize was handed over at London's Monument. £20,000 was raised for muscular dystrophy research.



US Gold for the Arc

Slowly but surely, the Archimedes is getting support from the larger games software houses. The latest, the giant US Gold, has two games in the pipeline: *Joan of Arc* and *Leaderboard.*

The first is a classic role playing game about the maid or Orleans, while the latter allows you to experience the excitement of a professional golf tournament. Both have been completely rewritten for the Arc, to make full use of the advanced graphics. and sound. *Joan of Arc* was actually developed in France by a company called Chip.

Development manager David Baxter said: 'Other games will follow, depending on the success of these two.' New games are likely to be conversions of existing software, although with the superior performance of the Arc, they should be even better than their 16-bit counterparts. US Gold are on 021-356 3388.

CUSTOMER HOTLINE

■ Response to the first Customer Hotline columns has been very gratifying. Here's how to get the best from Acorn's customer support staff. Comprehensive technical and sales support is regarded as essential, and Acorn's strategy calls for repairs and servicing, technical help, general information, application information and training services, as well as attention to customers' individual problems.

The Customer Services department is staffed by technical and market specialists. It provides direct support for educational customers, but most support to home users is through your dealer. Although written enquiries to Acorn are always dealt with, technical support by telephone is provided only to dealers or educational customers – not for general users. This means Acorn can offer special support for education, while still ensuring that home and business micro owners get a high level of support through the dealer network. The dealers attend training courses, and can phone for answers to specific queries. So if you have a problem, try your local dealer first. If this fails, then write to Customer Support. But please – don't ring us!

■ There's a competition running on SID, Acorn's Support Information Database. The prize is a copy of *Corruption,* the Archimedes graphical adventure game from Magnetic Scrolls. There are 10 copies to be given away, courtesy of Rainbird Software, so get dialling! You've got until the end of February. In case you aren't a registered SID user, you can access SID with a modem by dialing (0223) 243642 and using standard Prestel terminal software and Viewdata protocols. You can get full details of the competition on SID with *SIDCOMP#.

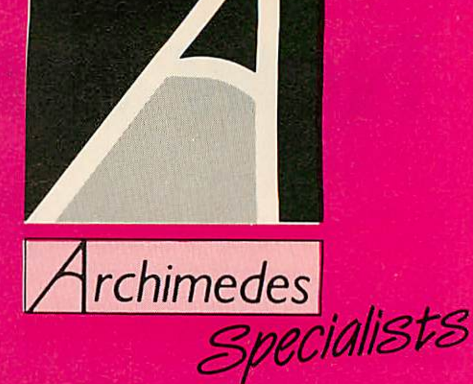
■ One of the things Customer Support does is to issue application notes on a wide range of programming subjects, from merging *ViewStore* databases to using the serial port on the Archimedes. But it's often quite difficult to know what a good topic is for a new application note. So if you've any suggestions on application notes you would like to see available, please write to me and I'll see what can be done.

■ This month's featured application note – *Using the serial port* – covers most aspects of using modems or other serial devices on the Archimedes. It details using the serial patch that corrects some bugs in Arthur 1.2, wiring up a cable and writing software to use the serial port. As usual, the application note is available free on request from Customer Support. If you include a formatted 3.5in disc, we'll put the serial patch on it for you.

■ A reminder to owners of Archimedes compilers. If you have a copy of the Pascal, Fortran or C compilers, then you can get an upgraded version too. You can upgrade by sending the original compiler disc and a cheque for £30 (per compiler) to Acorn Direct, Studland Road, Kingsthorpe, Northampton NN2 6NA. The upgrade is required before you can use the symbolic debugger which comes as part of the *Software Developer's Toolbox.*

■ *You can write to Phil Colmer and the Custmer Support department at Acorn Computers, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. If you've got a suitable modem, you can leave a message on SID.*

5% Discount On ALL Archimedes From BEEBUG



In Addition To. . .

1 0% FINANCE

For a limited period we are able to offer 0% APR finance over 9 months on the purchase of any Archimedes. You pay no interest at all. This is a **brand new** scheme only available from BEEBUG. The deposit and repayments are shown below.

Members Prices

	Deposit	9 Payments		Deposit	9 Payments
A305M			A310		
A305 Base	£79.66	£76.00	A310 Base	£93.24	£91.00
A305 Mono	£91.21	£82.00	A310 Mono	£104.79	£97.00
A305 Colour	£104.01	£100.00	A310 Colour	£117.59	£115.00
A310M			A440		
A310M Base	£104.79	£97.00	A440 Base	£278.93	£276.00
A310M Mono	£107.34	£104.00			
A310M Colour	£129.14	£121.00	A440 Colour	£303.28	£300.00

2 TRADE IN YOUR OLD BBC, MASTER OR COMPACT FOR AN ARCHIMEDES

We will be pleased to accept your old computer (in working condition) as part exchange towards the purchase of an Archimedes. (If you use the finance scheme this will replace your initial deposit on a 305/310, so you pay nothing now). Allowances are as follows:

BBC Issue 4 No DFS	£125	BBC Issue 4 DFS	£175
BBC Issue 7 No DFS	£175	BBC Issue 7 DFS (Or B+)	£225
Master 128	£250	Compact Base System	£215

Please phone for allowances on other Compact and Master systems.

3 EXPORT

Although unable to offer finance to overseas customers, we can offer an efficient export service with delivery to your door. Please write for a quotation.

4 FREE PC EMULATOR AND 1st WORD PLUS

Purchase your Archimedes by Cheque, Access, Visa, Official Order or 13.75% finance and we will supply you, absolutely free a Printer Lead, Ten 3.5" discs, a Lockable disc box and a choice of either a Free upgrade to RISC OS & Artisan Package or The PC Emulator (as supplied with a 310M). Additionally if you are purchasing a 440 system you will receive 1st Word Plus & Acorn's Software Developers Toolbox.

Prices Including VAT

A305 Base £763.66	Mono £829.21	Colour £1004.01
A310 Base £912.24	Mono £977.79	Colour £1152.59
A440 Base £2762.93		Colour £3003.28

5 13.75% FINANCE OVER 12 TO 36 MONTHS

As a Licensed Credit Broker we are able to offer finance on the purchase of any equipment, including the Archimedes. You still benefit from the free PC Emulator, discs, disc box and printer lead. (Typical APR27.5% on the purchase of a 310 Colour System over 36 months.
Deposit £152.59 36 payments £39.24)

6 DISCOUNTS FOR EDUCATION

We are able to offer attractive discounts to Education Authorities, Schools, Colleges and Health Authorities. Please write with your requirements for a quotation.

These discounts are available to you as a member of RISC User, THE leading magazine dedicated solely to Archimedes. So if you are not yet a member, join now for only £14.50 for a full year.

TO FIND OUT MORE PHONE OR WRITE NOW. TEL: 0727 40303

We offer a complete service, including Advice, Technical Support, Showroom, Mail Order and Repairs. Our showroom in St. Albans stocks everything available for the Archimedes. Call in for a demonstration.

AU 3/89

Please indicate your requirements below.
Subscription to Risc User (£14.50 UK) ☐ Information Pack and Catalogue ☐ 0% Finance Form for 305/310/310M/440 Base/Mono/Colour ☐ 12-36 Months Finance Form for 305/310/310M/440 Base/Mono/Colour ☐ Trade In BBC/Master/Compact ☐ Purchase 305/310/440 Base/Mono/Colour ☐
UK Courier Delivery £7.00. Overseas please ask for a quotation.

I enclose a cheque value £..............................

Please debit my Access/Visa/Connect Card No

Expiry ..../..... with £..........

Name

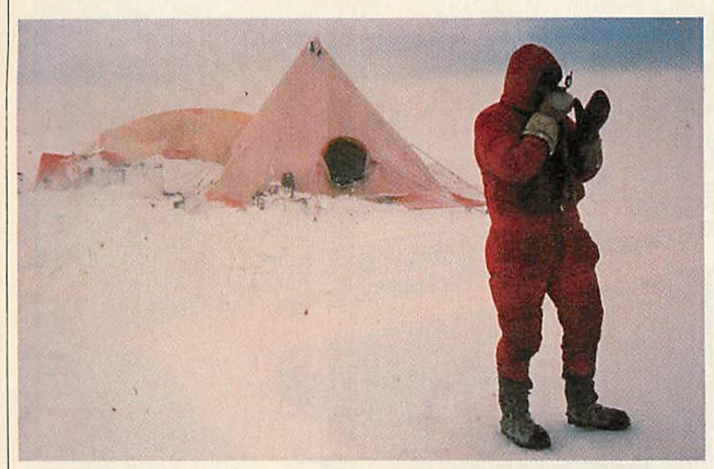
Address

Signature

Beebug, Dolphin Place, Holywell Hill, St. Albans, Herts AL1 1EX Tel: 0727 40303

BEEBUG – The Archimedes Specialists

BBC and Virgin launch IV discs



Join Sir Ranulph on his trip to the North pole

BBC Enterprises continues to win prizes with its range of interactive videos. The new *Countryside* disc won first prize in the education category of the British Interactive Video Association's Awards. The disc aims to give townspeople an understanding of the future of our countryside. Jan Maulden at the BBC's Interactive Video Unit said 'We are lucky to have a very experienced team of senior BBC producers who are hooked on the idea of marrying the disc and the computer.'

Richard Branson's Virgin group has also entered the world of interactive video with *North Pole Expedition,* the first of a range of discs. Unlike the BBC's discs the computer information is carried on separate floppy discs.

Based on Sir Ranulph Fiennes' real-life crossing of the Arctic, it boasts video footage from the expedition. Five students can participate, re-living the roles of the explorers. The discs come with a book of the expedition and cost £228.85. This package will be followed by further discs.

More Dabs books

Registered Dabs Press customers who own the Archimedes ABC Basic compiler package should have found an upgraded version of the program in the post at the end of January. ABC Version 2 contains new features including support for return parameters in procedures, a full package of local error handling and four new compiler directives. It comes with an updated user guide.

Dabs will also be publishing a second collection of IBM-compatible shareware at the end of February, costing £29.95 for the Master 512 and £35 for the Archimedes with PC emulator.

More user guides are in the pipeline with brothers Alex and Nick van Someren's *Archimedes Operating System – a Dabhand Guide*, and Chris Snee's *Master 512 User Guide* available at the end of February. Prices are £14.95 and £9.95 respectively.

THE COMMS COLUMN

■ A new service has been launched for Telecom Gold which outputs messages by voice, over a normal telephone, allowing users to access their mail from anywhere in the world without having a computer or modem available. Also copies of email and telexes can be forwarded onwards, for example, to fax machines – ideal if you are, say, travelling on business. With a fax available but no computer, you can redirect the voice message to the fax machine where you are staying. The talking TG service costs 24p per minute (12p per minute off-peak), plus £5 per month subscription, and £40 for the starter pack which includes a DTMF keypad to key in your ID, and other information. More information from Fuchsia Ltd on (0253) 892737.

■ Micronet has a special New Year offer for new subscribers – the cost of the first quarter's subscription is reduced from £20 to £9.95. The offer runs alongside Micronet's existing free modem offer for annual subscribers. At the same time Micronet is supplementing its domestic daily micro news coverage with the inclusion of *NewsBytes*, the international online computer news service from the USA.

■ Also new on Micronet is a reorganisation of the telesoftware section. Chargeable telesoftware no longer exists on the system, and free telesoftware is provided via a gateway through to an Amiga 2000 computer sitting in Micronet's offices, which contains the telesoftware files for a number of machines including the BBC B/Master. Free software for the Archimedes and Z88 is planned for the future. Micronet aims to become the prime supplier of free and public domain software.

■ We always like to feature bulletin boards with a purpose other than computing in this column, and an interesting one I have found is the Academics board, run by John Kelly on 021-705 9677 (24 hours, V21/V23), which exists to provide contact between Open University students. The board's download section is mainly for PC users (of course suitable for Master 512 and Archimedes PC Emulator owners), but there are many useful text files as well. To join the closed user group on the board, you must supply your Open University registration details.

■ Bulletin board spotlight this month falls on the Bradford Bulletin Board, which operates as you might expect, from Bradford, at V21 (300/300 baud) and V23 (1200/75) baud speeds. The board runs on a BBC B, using SAFBBS software, written by Sarfraz Hussein, who can be contacted on the board. The modem used is a Pace Series 4.

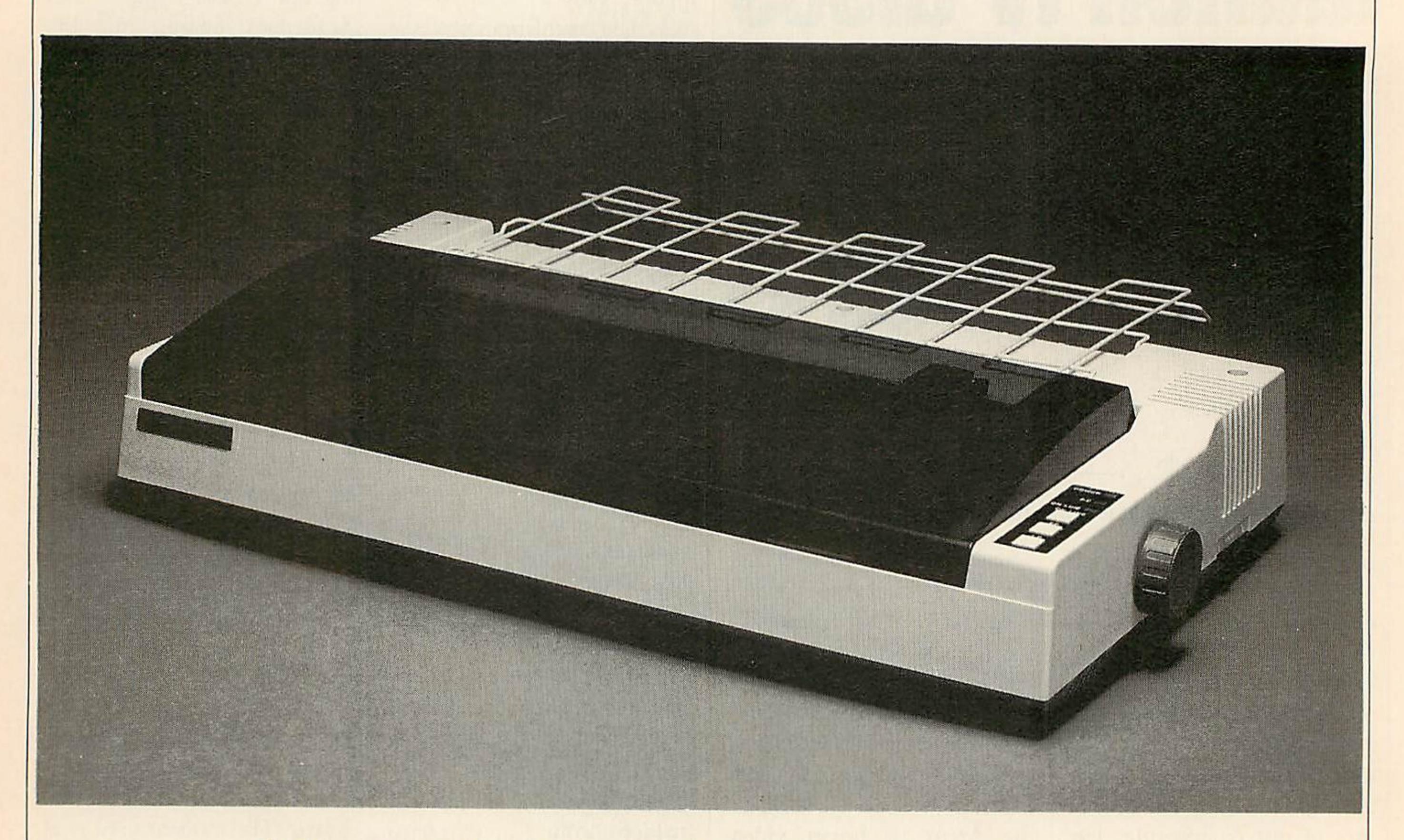
There is plenty of BBC downloadable software and feature sections, some of which are closed user groups. For example, there is an area on the board specifically for members of the Wakefield BBC User Group, one of the few remaining seriously active BBC User Groups.

This board allows you to download a complete UK bulletin board list. The SAFBBS software fully supports scrolling and Viewdata formats – further information on this BB software is also available on the board. The Bradford Bulletin Board is on (0274) 480452.

■ *Comms news for David Atherton can be sent to **BBC Acorn User**, or to his mailboxes on Prestel 942876210 or via Telecom Gold/Microlink 10072: MAG 11596.*

OFFERS

136-COLUMN PRINTER



Start printing with Acorn User's wide-carriage printer

Even with the 35 per cent EEC anti-dumping duty added to the price of our special, high-quality 136-column Sakata wide-carriage printer, it is still unbeatable value at £279 inclusive of VAT and delivery. A price which is still £100 under the recommended retail price.

The Sakata 5500 printer is Epson FX-compatible. It offers the following features: Pica, Elite and NLQ fonts plus a downloadable character set; a 3k printer buffer; friction and tractor feed for paper up to 16 inches wide; graphics modes compatible with *Acorn User*'s *UserDump* ROM; super and subscripts; bold and italics.

The printer is both fast and quiet, printing at a rate of 180 cps (draft mode) or 40 cps (NLQ mode) with a noise level of less than 55 decibels.

The Sakata 5500 printer takes ribbons which are easily obtainable. We are supplying each printer with a free 1.5 metre BBC printer cable, a plug, a 12 month guarantee and a supplement for the BBC. Post the coupon today.

Please send me ______ Sakata 5500 printers at £279.

I enclose my cheque/postal order for £ ________
made payable to **Redwood Publishing Ltd**

Please charge my Access/Barclaycard £ ________

ACCOUNT NO. ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ EXPIRY DATE ☐☐☐☐

NAME ________

ADDRESS ________

________ POSTCODE ________

SIGNED ________ DATED ________

Send this coupon with your remittance to **Printer Offer, *BBC Acorn User* Merchandising, 20-26 Brunswick Place, London N1 6DJ. Or fax your order to 01-490 0494.**

EXCLUSIVE ACORN USER OFFER

NEWS IN BRIEF

■ Schools who want an on-site demonstration of the Archimedes will now be able to do so without any charge or obligation. And they'll also be able to obtain a copy of *Micro News*, the Acorn video which demonstrates the Arc's potential for the classroom.

This is part of Acorn's new free Schools Service. This will apply not only to Acorn's own products but also to software and hardware producers who create products related to its machines.

Details of the Schools Service will be arriving in larger secondary schools during March, while smaller secondary and primary schools will be approached later on.

■ School users of on-line systems can now dial into the French Teletel system more cheaply. Until now, the full service has only been available in the UK through an international phone call. Direct dial access from outside France is now being phased out by French Telecom.

Aldoda now offers MinitelNETpi. The PSS gateway gives full access to Teletel, including the business and professional services. Subscriptions to MinitelNETpi are bought on the basis of blocks of time so, for example, five hours, access costs £48.

■ *Databox* (£19.95 for a teacher and three student packs) from Soft Teach is a database program designed to tie in with GCSE Computer Studies work. It tackles data capture, validation, verification and handling on a BBC B, Master, and Econet.

Go for it! (£14.95) is based on the BBC TV health programme of the same name. It is designed to raise awareness of dietary habits at junior and secondary level. It also looks as the issues raised by alcohol and tobacco.

SEMERCs to go

By Nick Evans

This April sees the end of national funding for SEMERCs (Special Education Microelectronics Education Regional Centres), originally founded under MEP (Microelectronics Education Programme). Some of these centres have been taken over by LEAs, other are disappearing, but MESU has encouraged the development of regional resource centres in Oldham, Bristol, Newcastle, Doncaster, Surrey and Hertfordshire.

These centres will build on the 68 advisory teachers who were appointed under the ESG scheme specifically for Special Educational Needs. It is hoped that MESU will be used as a focus for activities including INSET support and software development, adding to the work that has already gone on in the five national SEMERCs.



Funds won out for Special Needs centres

MESU's aims have been directed by responses to a survey it undertook recently, which highlighted the need for continued support in many areas, not least in terms of keeping alive the Special Needs Software Centre in Manchester and the continuation of the ACE Centres which deal with children with communication difficulties.

No equality yet

Equality for girls hasn't reached the school computer room yet, claims Celia Hoyle, professor of mathematics of London University's Institute of Education. Computer use is still dominated by boys.

Professor Hoyle's observations appear in a book published by the University. She emphasises the need for cross-curricular use of new technology as a means to break the mould of single-subject study of computers.

Studying computers themselves tends to be a favourite option for boys. In a computer class the environment created by the teacher is less likely to be supportive for girls.

Professor Hoyles notes that there is less likelihood of girls having access to computers at home. And the pressure for boys to study a traditionally male subject tends to exclude girls in much the same way as was the case with heavy craft and engineering subjects.

Girls and Computers – Bedford Way Paper 34 costs £5.50 from the Institute of Education, 20 Bedford way, London WC1H 0AL.

Free education discs

Peter Davey is providing a free program service for anyone involved in adult basic education. The programs cover numeracy and literacy and so far run to 11 40-track discs of software. One set of programs aimed at visually handicapped pupils uses Superior Software's *Speech!*

To get them, send 11 blank formatted 40-track discs plus £1 to cover documentation and postage. Details are available from Peter Davy, 68 Headlands Road, Ossett, Wakefield, West Yorks WF5 8HX, tel (0924) 274403.

New data files for ITV Key

There are new datafiles available for ITV's *Key* database management system. The *Flowers from Seed* and *Vegetables from Seed* datafiles come complete with a Sphere paperback book. The data allows you to cross-reference entries with the book and discover, for instance, the range of plants needed to supply vegetables throughout the year. Or you can choose plants for different environments.

The *Antarctica* file has details of the exploration of the icy continent, its wildlife and the scientific bases there. *Periodic Table* enables pupils to examine the range of properties associated with each element; similarly the *Rocks and Minerals* file allows an in-depth study of Earth sciences tied in directly with the objectives of the National Curriculum. All the files cost £15 from your local regional ITV education officer or the ITV Association.

ProArtisan has its faults

Unsurprisingly, *ProArtisan* is an advanced version of Clares *Artisan*. On screen and in use, there's not much difference between the two. The most notable change is the screen mode – *ProArtisan* uses the 256 colours of mode 15. But there's no way of changing the 'default' set of 256.

Clares has taken the original *Artisan* and added several new features while updating and improving existing parts


Easy shading effects

to make use of the extra colours. You can now pick a selection of 22 predefined groups of colours with which to fill. This means that realistic graduated shading effects are quick and easy.

An airbrush facility has been added for all you budding 'graffiti' artists. Another brush allows colours to be 'smudged' together, or to give a 'soft-focus' effect.

There's now also 'true' cut and paste – the cut area can be irregular, not just a rectangle. Once created, sprites can be squeezed into any solid area of the screen, and deformed into a circle, say.

ProArtisan is not cheap at £169.95. And it still has its faults; it is still impossible to see what is being changed when using the pixel-editor, sprites can't be moved off the right of the screen, and the menus disappear too quick for my liking. It is an extremely versatile tool, which should find its way into several professional design studios.

Rob Miller

Domesday at the North Pole

Virgin's £229 *North Polar Expedition* is the first non-BBC software for the 'Domesday' advanced interactive video system. At first sight, Sir Rannulph Fiennes Transglobe expedition could make an exciting video subject. But the result is a tired question and answer format in what should be an innovative new medium. Typical is 'How many 10-litre cans of fuel should you load? Point to one of four answers on the screen'. There are five sets of questions, and five 'roles' to play – mechanic, navigator, pilot, base camp controller and team leader.

In fact all the answers are in a giant 500-page paperback book of the expedition that comes with the pack. The


Sir Rannulph Fiennes – in the cold

short video clips don't offer much in the way of explanation, and often you can't go back and modify your answers when you get something wrong. The video content sometimes seems almost superfluous – this could have been a normal floppy disc package with little loss of educational value.

All of the moving video footage was gleaned from existing documentary material. Screen presentation often seems cluttered, with numerous computer-generated icons and windows obscuring the 'TV' picture. And there's little use of sound. All the computer software is on two floppy discs – Virgin hasn't made use of the LV-ROM capability to put the software on the laser disc itself.

North Polar Expedition could have been a good use of interactive video. But it misses so many opportunities. Schools which are desperate for more uses for their Domesday systems aren't quite this desperate yet.

Graham Bell

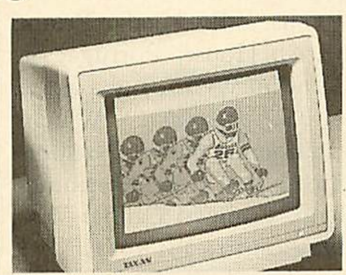
Monochrome monitors make the grade

Taxan monitors have a good reputation, and the latest KX119 models look set to live up to the standard.

I checked the amber screen version with a BBC micro. The case is a neat grey, very boxy in shape and considerably larger looking than some monitors like the Zenith ZVM1200. It comes with a moulded mains plug and a video lead. The one supplied is suitable for a Compact; make sure you get a BNC-type for a model B or a Master.

There's a comprehensive range of controls for horizontal and vertical hold, position, and size on the back, plus a tool to adjust them. It's worth persisting with these.

When switched on, the screen shows a pleasant orange shade, but on the first monitor I tried, it was too dark. The brightness and contrast controls on the right side of the monitor were little help. In fact, it was necessary to re-


Taxan KX119 monitors

adjust the brightness control on the monitor's circuit board – not recommended unless you're a TV service engineer. The focus control also needed tweaking. But a second monitor I checked was perfect – so see the one you're going to buy working if possible.

Once set up properly, the two monitors worked well; they display a good steady picture and perform well with Chris Drage's monitor test programs from December 1987. If you want a mono monitor, they are more expensive than most, but good value at around £95.

Graham Bell

Neater labels

Wight Scientific has launched another package to follow its excellent *Signwriter*. The new package is *Labelwriter*. Where this package rises far above the crowd is flexibility.

You can define the label size, and the number of labels on the page. Once this has been done, you can then print out as many or as few labels as you wish. There are various menus which allow you to set up – any print style available on an Epson-compatible printer. You can also create text in *Signwriter*, and then combine that with your label in *Labelwriter*. Indeed, the *Labelwriter* disc itself is printed using this facility, and there are full instructions in the manual to do this.

The most powerful feature is the ability to make use of a database of addresses created with a wordprocessor, and then print sheets of labels out, with a different address on each label. It makes mailshots a piece of cake.

Kevin Kealy

Contacts

Acorn Computers, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Tel: (0223) 245200.

Aldoda International Ltd, 27 Elizabeth Mews, London NW3 4HH. Tel: 01-586 5686. Gold/TTNS 74: LOT 1105.

Arbiter Leisure, Unit 8, Eldonwall Trading Estate, Staples Corner, Priestley Way, London NW2 7AF.

BBC Enterprises, Woodlands, 80 Wood Lane W12. Tel: 01-576 0202.

BBC Interactive Television Unit, BBC Elstree Centre, Clarendon Road, Borehamwood, Herts WDJ 1JF. Tel: 01-953 6100.

Clares, 98 Middlewich Road, Northwich, Cheshire CW9 7DA. Tel: (0606) 48511.

Dabs Press, 5 Victoria Lane, Whitefield, Manchester M25 6AL. Tel: 061 766 8423.

Human Computer Interface, 25 City Road, Cambridge CB1 1DP. Tel: (0223) 314934.

Innocent Software, Benowyn, Park Form Road, West Wycombe, Bucks HP12 4AF. Tel: (0494) 462969.

ITV Association, 6 Paul Street, London EC2A 4JH. Tel: 01-247 5206.

Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ. Tel: (0223) 323656.

Minerva Software, 69a Sidwell Street, Exeter, Devon EX4 6PH. Tel: (0392) 437756.

Silicon Vision, Signal House, Lyon Road, Harrow, Middlesex HA1 2AG. Tel: 01-422 2274.

Soft Teach Educational, Sturgess Farmhouse, Longbridge Deverill, Warminster BA12 7EA. Tel: (0985) 40329.

US GOLD, Unit 2 & 3, Holford Way, Holford, Birmingham B6 7AX.

VLSI, 486-488 Midsummer Boulevard, Saxon Gate West, Central Milton Keynes, MK9 2EQ. Tel: (0908) 667595.

Virgin Publishing, 2-4 Vernon Yard, 119 Portobello Road, London W11 2DX. Tel: 01-727 8070.

In next month's issue

Next month in *BBC Acorn User*, there's a superb type-in game for Easter: *RuneMaker – Codename Druid* is just right for our 'Spring equinox' April issue. It could be the best BBC game ever published in a magazine, and features druids racing to run around Stonehenge before sunrise. Plus there are runes to collect, and even riot police to avoid.

Back from his holidays, Joe Telford describes ways to make Basic programs make use of wordprocessor files. The yellow pages contain a program to make up multi-column text in *View*.

Roger Carus concludes his look at current business software for the Beeb. From Dave Futcher, there's a round-up of fancy font software for the BBC micro – *Fontwise, Multi-font NLQ, Hyperdriver* and so on.

For the Archimedes, there's a description of the floating-point emulator, and how to make use of it in your own Archimedes programs.

And there's an in-depth look at a system that provides the Arc with the original object-oriented programming environment – *Smalltalk-80* from Smalltalk Express.

Plus, of course, all the regulars.

Diary dates

21 February, Computers & Mental Health Seminar, King's Fund Centre, London NW1. Contact: G Evans, Portugal Prints, Parish House, Portugal St, London WC2, 01-404 4267.

21-24 February, Which? Computer Show, National Exhibition Centre Birmingham. Contact: Cahners Exhibitions 01-891 5051.

Price Increase

The £1 increase in the cost of our reader service comes after several years of charging the modest figure of £3. The increase is simply to help cover our own costs — in fact, it costs us more than £4 in time and effort to answer each query. But readers can still be sure of getting detailed and helpful replies where possible for the new fee of £4.

BLUNDERBOX

People who have bought the *Acorn User* Games disc may have experienced some problems in getting it to work on a BBC model B. If you are one of the unlucky few, you can obtain a list of changes to configure the disc for a model B by sending an sae marked 'Games Disc Changes' to *BBC Acorn User* Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ.

Teacher talks

The National Council for Educational Technology is organising CAL 89, the ninth in a series of biennial conferences on computer assisted learning. The conference is being held on 11-14 April at the University of Surrey in Guildford. Further details are available from Diana Bourne, PO Box 32, Salisbury, Wiltshire SP5 5HD.

Technomatic

Technomatic has expanded and moved its office to: 468 Church Lane, London NW9, 8TQ, tel: 01-205 9558.

POST A PROBLEM

BBC Acorn User has a guaranteed fast reply service for enquiries. Your answer will be returned within 10 working days for just £4 (includes VAT), or your money back.

Just write out your problem, fill in the coupon (right), and send both off to *BBC Acorn User* with a stamped addressed envelope and cheque or postal order for £4 made out to Redwood Publishing. If you want recorded delivery add the cost of this on. Include as much detail as possible, and a disc or cassette if a program is involved, with enough space to record any corrected listing.

Please note: debugging readers' programs or those from other magazines is a complex task and we cannot guarantee to give a full solution. Unless this problem can be spotted quickly, the service will only be able to make general comments.

We will answer the problem and return all material received – within a guaranteed 10 working days from receipt. If we fail to match this promise then your cheque or postal order will be returned with the answered question – you can't lose.

BBC ACORN USER READER SERVICE
20-26 Brunswick Place, London N1 6DJ.

NAME ______________________________

ADDRESS ______________________________

____

____

POSTCODE ______________________________

DAYTIME PHONE NUMBER ______________________________

I enclose a cheque/postal order for £4 made out to Redwood Publishing and an sae with my problem.

OFFICE USE ONLY Date in:

Date out:

Answered by:



Lots of characters to add to its features.
The Panasonic KX-P1180 is packed with a lot more features than you'd expect in a printer costing so little. And with print speeds up to 192 characters per second, it's the printer which won't keep you waiting.
The KX-P1180 is the ideal choice for people who demand professional-quality output. It's flexible, versatile and easy to use, with superior paper handling technology – all designed to give you total control over your printing. And with its exceptionally low noise level (less than 55dBA) plus legendary Panasonic reliability, you can trust the KX-P1180 to keep its competitive edge, year after year.
● Easy feeding of A4 paper, portrait or landscape
● Rear and bottom-feed tractors give easy loading of continuous paper, labels and multi-part stationery with paper parking and low tear-off facilities
● 192cps draft speed, 38cps in NLQ
● Excellent print quality in a choice of five resident fonts
● Easy set-up via front panel – no DIP switches
● Industry-compatible emulations and interfaces.
Panasonic
Office Automation
OA
Panasonic KX-P1180 Multi-Mode Printer
Contact Julie Everard
AU 3/89
Panasonic Industrial UK
A Division of Panasonic Europe Ltd.
280-290 Bath Road, Slough
Berks. SL1 6JG
Tel: 0753 73181 Telex: 847811
Fax: 0753 77339
I would like more information on the Panasonic KX-P1180 Printer.
Name
Job Title
Company Name
Address
Post Code
Tel No.
Panasonic. Superior printers…setting the standard.

The Atari 520STFM



Of £450 worth


MARBLE MADNESS. £24.95
Electronic Arts.


TEST DRIVE. £24.95
Electronic Arts.



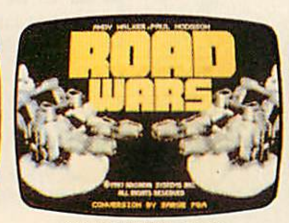
BEYOND THE ICE PALACE. £19.95
Elite.


BUGGY BOY. £19.95
Elite.


EDDIE EDWARDS SUPER SKI. £19.95
Elite.


IKARI WA


CHOPPER X. £9.99
Mastertronic.



ROADWARS. £19.95
Melbourne House.


XENON. £19.95
Melbourne House.


ARKANOID II. £19.95
Imagine.



WIZBALL. £19.95
Ocean.


BLACK L
Fi

Here it is! The new Super Pack from Atari. You don't just get the brilliant 520STFM. We're giving you twenty-two great software titles that most people would gladly sell their grannies for.

There's no catch. You really do get the 520STFM and £450 worth of great software titles for just £399.99.

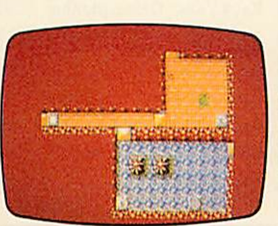
So make sure you include yourself in this great offer.*

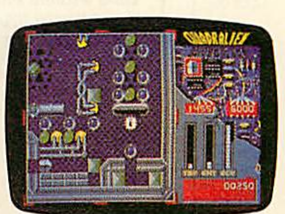
*Available from most Atari dealers. Offer ends March 1st 1989.

. £399.99 inclusive.



n of software.


RS. £14.95

RANARAMA. £19.95 Hewson.

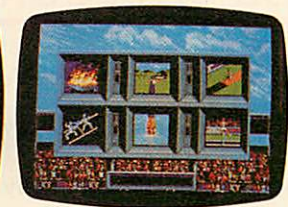
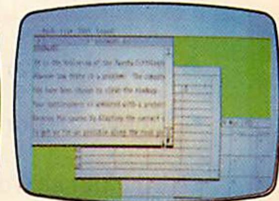
THUNDERCATS. £19.95 Elite.

ZYNAPS. £19.99 Hewson.

QUADRALIEN. £19.95 Logotron

STARQUAKE. £19.95 Mandarin.



P. £19.95 rd.

GENESIS. £19.95 Firebird.

THRUST. £9.95 Firebird.

SECONDS OUT. £19.95 Tynesoft.

SUMMER OLYMPIAD 88. £19.95 Tynesoft.

ORGANISER BUSINESS SOFTWARE. £49.95 Triangle Publishing.

Please send me details of this and other Atari Products AU 3/89

Name ________ Address ________

________ Postcode ________

Atari Corp (UK) Ltd., Atari House, Railway Terrace, Slough, Berkshire SL2 5BZ



COMP SHOP LTD

A MEMBER OF CARYWOOD PLC

PART EXHANGE YOUR BBC B OR MASTER FOR ANY OF THESE PRODUCTS – CALL FOR DETAILS

BBC Master Series

Item	Price
Master 128	331.00
Master Turbo upgrade	105.00
Master 512 upgrade	99.00
ISO Pascal	49.00
Interword	35.00
Intersheet	35.00
Interbase	48.00
Spellmaster	39.00
Mega 3 ROM	69.00
Edword 2	42.00
Acorn DFS Upgrade	49.00
Second User BBC Bs	from 175.00

AMSTRAD Computers

Item		Price
PC1640SD	Mono	469.00
PC1640DD	Mono	569.00
PC1640HD20	Mono	829.00
PC1640SD	Colour	599.00
PC1640DD	Colour	699.00
PC1640HD20	Colour	959.00
PC1640S	Enhanced Colour	739.00
	Enhanced Colour	839.00
PC1640HD20	Enhanced Colour	1099.00
PCW 8256		339.00
PCW 8512		429.00
PCW 9512		449.00
DMP4000 15" Printer		199.00
uScribe 30Mb Drive + cont		349.00
Wordstar 1512		49.00
Supercalc 3.1		49.00
Accounts Master DD		79.00

ACORN Archimedes

Model		Price
A305	Base	599.00
	Mono	649.00
	Colour	789.00
A310	Base	709.00
	Mono	759.00
	Colour	899.00
A310M	Base	759.00
	Mono	809.00
	Colour	949.00
A440	Base	2149.00
	Mono	2199.00
	Colour	2349.00

EUROMICRO Systems

Item	Price
286/10 1 MByte RAM, 1.2 Mbyte floppy, Mono Monitor	1099.00
286/10 1 MByte RAM, 1.2 Mbyte floppy, EGA Colour Monitor	1499.00
286/10 1 MByte RAM, 1.2 MByte floppy, Mono Monitor, 20 Mbyte Winchester	1299.00
286/10 1 MByte RAM, 1.2 MByte floppy, EGA Colour Monitor, 20 MByte Winchester	1699.00

Complete with 101 Key Keyboard, Serial and Parallel ports, MSDOS v3.21., and GMBasic.

10th ANNIVERSARY SALE

COMPSHOP ESTABLISHED NOVEMBER 1978

PRINTERS

Make	Model	Price
Epson	LX800	169.00
	LQ500	269.00
	LQ850	459.00
	LQ1050	579.00
	LQ2500+	729.00
	FX850	329.00
	FX1050	429.00
	EX800	439.00
	EX1000	579.00
	GQ3500	1229.00
Panasonic	1081	140.00
	3131 Daisywheel	229.00
Star LC10		189.00
Canon PW1080		169.00
Canon PJ1080 Colour		399.00
Juki 6100		279.00
Intergrex Colour		499.00

CUMANA Disk Systems

Model	Capacity	Price
Single without PSU		
CSX200 40T	200K	75.00
CSX400 80T	400K	89.00
CSX354 3.5"	400K	74.00
Single with PSU		
CS100 40T	200K	89.00
CS400 80T	400K	104.00
CS354 3.5"	400K	87.00
Dual without PSU		
CDX400 40T	400K	146.00
CDX800 80T	800K	176.00
Dual with PSU		
CD400 40T	400K	169.00
CD800S 80T	800K	195.00
CD358 3.5"	800K	147.00
Combo 5.25"/3.5"	800K	225.00

MONITORS

Model	Price
Philips	
12" Green 7502	65.00
14" Green 7752	79.00
CM8833 Colour	215.00
Microvitec	
1431MS Std Res	165.00
1431DS Std Res	165.00
1431MS/AP	198.00
1431DS/AP	198.00
1451MS Med Res	196.00
1451DS Med Res	196.00
1451MS/AP	249.00
1451DS/AP	249.00

JUNK BOX (ex-demo) (or second hand)

Item	Price
TEC F10-40	499.00
Acorn Z80 Second Processor	100.00
Anadex 8500 (Non-runner)	50.00
Cumana CD200 Disk Drive	100.00
Cimana CSX100 Disk Drive	50.00
Cumana CS400 Disk Drive	70.00
Microvitec 1431 Monitor	120.00
Philips Amber Monitor	60.00
Kaga Taxan Green Monitor	50.00
Apple Macintosh Add-on drive	100.00
Apple Disk with Controller	99.00
Apple Additional Disk Drive	99.00
Duodisk with Controller	149.00
Apple Monitor	50.00

ALSO RANGE OF SECOND USER BBC AND AMSTRAD EQUIPMENT

- 12 Months Parts and Labour Warranty.
- Deliver per order by courier £12.50, by post £3.00.
- Eductional, Government and nationally recognised PLC orders welcome.
- These prices apply to cash (or cheque, normal conditions apply) sales, and official orders only.
- Prices subject to change without notice.
- Prices exclude VAT (Please add 15%).

Innovation House, Albany Park, Frimley Road, Camberley, Surrey GU15 2PL, England.

Telephone:

(0276) 22677 (Sales) **(0276) 684715 (Technical)** **(0276) 29219 (Accounts)**

Fax: (0276) 684716

AT £9.95



WE'RE REALLY TALKING!

Now, you can turn your computer into a communications terminal that will download free software, access up-to-the-minute computing information, play exciting multi-user games, talk to other people (and computers) – and a lot more – all for just £9.95.

In other words, you can now join Micronet* – and discover a whole new world – for less than half the normal price if you apply before March 31st 1989.



FREE SOFTWARE

On Micronet you can browse through an extensive software library of free programs, select one and then download it.

We now have software for all popular machines, from the Spectrum to PC compatibles, including the Atari ST and the Amiga.



INFORMATION

Micronet is also a computer magazine. Our computer news area is updated every day, so there's no better way to stay up-to-date, and our software reviews and features for all popular micros mean Micronet members are always better informed.

Add to this Prestel's massive database and you'll have all the facts at your fingertips.



ENTERTAINMENT

Micronet is not just informative, it's also a lot of fun! As a member you'll have access to a range of games, including the UK's most popular multi-user game, Shades, where the action is live and so are your opponents!

FREE DEMONSTRATION

If you have access to a modem (1200/75 baud) and viewdata communications software you can see a free demonstration of Micronet. Just Dial 021-618 1111 and use the ID 4444444444 and password 4444.

You can look up a local telephone number once on-line.



COMMUNICATIONS

Join Micronet and use your computer to communicate with thousands of other users. From electronic mail, telex and fax to chatlines and teleconferencing, Micronet lets you do the talking.

LOW COST

And the good news is that at £9.95, not only is your first quarter's membership to Micronet now less than half price, but using Micronet starts at just 50p an hour – and that includes telephone charges! Wherever you are, Micronet is just a local phone call away.

And if you need a modem, we'll even give you one free when you take out a year's subscription.

Just phone our Sales Desk on 01-837 7872 or clip the coupon today for more information and a free brochure.

Join Micronet, and get talking!

Return to: Micronet, Telemap Group Ltd, Durrant House, 8 Herbal Hill, London EC1R 5EJ.

Name: ______

Address: ______

Tel. No.: ______

Age: ______

Machine Type: ______

AU/SP/3 89

MICRONET

* Price includes 1st quarter residential subscription by direct debit only (normally £20) and does not include hardware or software. Minimum subscription period 1 year. Offer available only in the UK to new members. Free modem offer available to first time UK subscribers while stocks last.

Dabhand Users: New for 89!

NEW: ABC Version 2: Now even better!

"...Excellent Dabs Press product. Buy it!" RISC User Dec.88

"ABC is a vital part of any programmer's toolbox, it puts compilers on other systems to shame. Unquestionably one of the most impressive pieces of software I have yet seen running on the Archimedes." A&B Dec 1988

"...I can tell you now, I am very impressed. This is a superb package." Archive Dec 1988

The above quotes were refering to Version 1 of ABC - ABC Version 2 is even better! Version 2 allows use of double and extended precision floating point, multiple exits from procedures and functions, RETURN parameter passing, new compiler directives and very much more.

As all reviewers have found, ABC makes writing machine code programs and relocatable modules easy. Programs can be written using the full range of BASIC V's error messages and report's, and once fully working, run through ABC which transforms them into machine code, ready for immediate action.

Demo Disc: We have produced a demo disc of ABC which still supports over 100 commands. It costs just £2 and this is refundable on any subsequent purchase. A full specification sheet is also available on request.

ABC was written by Paul Fellows head of the team that wrote the Archimedes Operating System. Registered users will receive version 2 automatically free of charge - how's that for service!

£99.95

NEW: Archimedes Operating System

Hot off the presses, this latest Dabhand Guide is essential reading for every user of the Operating System including Arthur *and* RISC OS.

Its 320 pages are packed with vital information and covers topics such as VIDC, MEMC, IOC, Sound, SWIs, Vectors, Filing System and very much more. Price is just **£14.95** or **£21.95** with programs disc and manual.

Archimedes Assembly Language

386 pages devoted to programming the Archimedes in machine code. At **£14.95** it is the *only* book which deals specifically with assembler on the Archimedes. Book and programs disc ordered together – **£21.95.**

Arcendium: Board Game Fun for All!

Backgammon, Draughts, Reversi and Quadline – four games for the price of one! Sure to get the whole family using the Archimedes.

Arcendium allows numerous levels of play either against an opponent or the computer. Sound, speech and superb colour graphics all add to the fun. Includes on-line help and re-play facilities plus more...

£14.95

Alerion: Archimedes Arcade Action!

The highly acclaimed all-action shoot-em-up for the Archimedes. 256 colour mode graphics, with digitised speech. Impossible to finish! Superb fun!

"...the gameplay makes this game a winner...a first rate game..." A&B Computing.

£14.95

Archimedes PC Emulator Shareware

Five discs full of PC software tested with the emulator to ensure compatibility. The collection includes software you would normally expect to pay a fortune for and includes a wordprocessor, spreadsheet, games, flowchart designer, printer utilities, and very much more.

Mindreader is a powerful wordprocessor with mailmerge, spelling checker, and an amazing 'word anticipate' feature. As Easy As is a full-function Lotus-compatible spreadsheet, with macros and graphics. Games include Bridge, colour chess, plane-flying etc. Utilities include a writing style analyser, font designer, letter-quality text printer ... and so the list goes on. Nearly **4Mbs** of PC action complete with User Guide.

£34.95

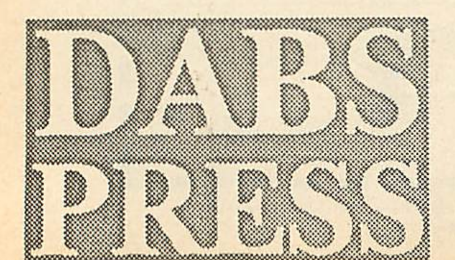
Master 512 Shareware Collection

Five 800k discs bursting at the seams with software fully tested on the Master 512. Includes a powerful wordprocessor with spelling checker, mailmerge etc. Lotus compatible spreadsheet, with macros, graphics etc. Games include Bridge, colour chess, plane-flying etc. Utilities include a writing style analyser, font designer and so the list goes on.

£24.95

Dabs Press Master 512 User Guide available end of February just £9.95. Master 512 Technical Guide available March. £14.95.

FREE on Request Bumper Catalogue!



5 Victoria Lane (AUM), Whitefield, Manchester M25 6AL

Tel: 061-766 8423 BT Gold: 72:MAG11596 Prestel: 942876210

Prices include VAT and P&P (UK/BFPO/CI). **ACCESS/VISA** accepted by post/phone/Mailbox/in person. Cheques and POs to address above. Dabs Press products available from all good dealers. Add £2.50 (£12 air) if outside UK. Official orders welcome.

The Best Games at the Lowest Prices

Mercury

Why should you buy software from Mercury Games?

Here's 10 good reasons!

	Reason	
1	Lowest Prices	Compare our low prices with those of other mail-order companies. We will not knowingly be beaten on price for any of the software that we sell.
2	Immediate Despatch	All orders are despatched by first class post on the same day as we receive them.
3	First Class Post always used	All orders are despatched by first class post on the same day as we receive them.
4	All the Best Games in stock	It is the policy of Mercury Games to stock only the best BBC Micro, Electron, and Archimedes software. Therefore, if a game appears in our list, this is your safeguard of quality. In particular, we have rejected many budget-priced games.
5	No Membership Fee	Mercury Games does not believe in requiring you to pay a membership fee for our services.
6	Free Postage & Packing	Our prices are fully inclusive of postage & packing, and V.A.T. There are no hidden charges.
7	Special Offers	See Special Offer below.
8	Access and Visa Welcome	For your convenience, we are pleased to accept payment by Access or Visa.
9	24-Hour Telephone Answering Service	We have a 24-Hour Telephone Answering Service enabling you to place an Access or Visa order at any time that is convenient for you.
10	Over 30,000 Customers	Mercury Games News (our official publication) now reaches over 30,000 people.

SPEND £30, AND SELECT 1 FREE GAME

SPECIAL OFFER

If you order software whose total value amounts to £30 or more, you may select any game from the current Mercury Games list completely FREE-OF-CHARGE.

IMPORTANT NOTE: This offers closes on 31st March 1989.

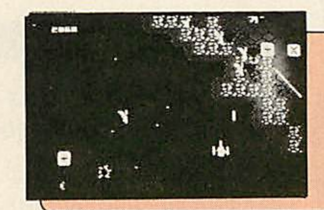
Don't Miss These Games



BARBARIAN II

(available mid-March)

The sequel to BARBARIAN is partly an adventure game and partly an animated fighting game.



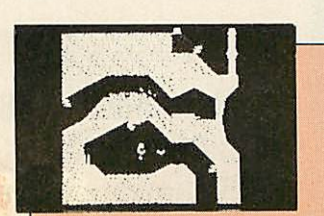
PLAY IT AGAIN SAM 7

This must be the best compilation yet! Features FIRETRACK, BONECRUNCHER, SNAPPER and GHOULS.



A QUESTION OF SPORT

An intriguing sports-trivia game for all the family.



EXILE

Possibly the best BBC Micro and Electron game ever! Judge for yourself.

y Games



Title	M	BBC or Electron Cassette	BBC 5¼" Disc	Master Compact 3½" Disc
SUPERIOR/ACORNSOFT				
Barbarian II (available mid-March)	M	£6.95	£8.95	£11.25
A Question of Sport	M	£9.50	£11.50	£15.75
Exile	M	£9.50	£11.50	£15.75
The Last Ninja	M	£6.95	£8.95	£11.25
Repton Infinity	M	£9.50	£11.50	£15.75
By Fair Means or Foul	M	£6.95	£8.95	£11.25
Pipeline	M	£6.95	£8.95	£11.25
Barbarian	M	£6.95	£8.95	£11.25
Spycat	M	£6.95	£8.95	£11.25
Quest	M	£6.95	£8.95	£11.25
Around The World In 40 Screens	M	£5.25	£6.25	£7.25
The Life of Repton	M	£5.25	£6.25	£7.25
Repton Thru Time	M	£5.25	£6.25	£7.25
SPEECH! (BBC only)	M	£6.95	£8.95	£11.25
Elite	M	£9.50	£11.50	£15.75
Revs & Revs 4 Tracks (BBC only)	M	£9.50	£11.50	£15.75
Archimedes Repton 3	-	Archimedes disc only		£15.75
Zarch	-	Archimedes disc only		£15.75
Conqueror	-	Archimedes disc only		£19.75
SUPERIOR/ACORNSOFT COMPILATIONS				
Play It Again Sam 1	M	£6.95	£8.95	£11.25
Play It Again Sam 2	M	£6.95	£8.95	£11.25
Play It Again Sam 3	M	£6.95	£8.95	£11.25
Play It Again Sam 4	M	£6.95	£8.95	£11.25
Play It Again Sam 5	M	£6.95	£8.95	£11.25
Play It Again Sam 6	M	£6.95	£8.95	£11.25
Play It Again Sam 7	M	£6.95	£8.95	£11.25
Acornsoft Hits 1	M	£3.50	£8.95	£11.25
Acornsoft Hits 2	M	£3.50	£8.95	£11.25
Superior Collection 1 (BBC only)	M	£6.95	£8.95	£11.25
Superior Collection 2 (BBC only)	M	£6.95	£8.95	£11.25
Superior Collection 3 (Elec only)	-	£6.95	-	-
TYNESOFT (Please state 40 or 80 Track when ordering discs)				
Circus Games (available soon)	?	£6.95	£11.25	-
Superman (available soon)	?	£6.95	£11.25	-
Summer Olympiad	M	£6.95	£11.25	£11.25
Winter Olympiad '88	M	£7.25	£11.75	£11.75
Saigon	M	£7.25	£11.75	-
Indoor Sports	M	£7.25	£11.75	£11.75

Title	M	BBC or Electron Cassette	BBC 5¼" Disc
SUPERIOR/BLUE RIBBON			
Repton	M	£2.50	-
Citadel	M	£2.50	-
Karate Combat	M	£2.50	-
Stryker's Run	M	£2.50	-
Deathstar	M	£1.65	-
Smash and Grab	M	£1.65	-
Mr. Wiz	M	£1.65	-
Percy Penguin	M	£1.65	-
ASL			
Shark	M	£7.25	£9.25
CDS			
Colossus Chess 4	M	£7.25	£11.75
Football Director (BBC only)	M	£7.25	£10.25
DOMARK			
Star Wars	M	£6.95	£9.75
The Empire Strikes Back (BBC only)	M	£6.95	£9.75
Trivial Pursuit (Genus ed.) (BBC only)	M	£11.75	£15.75
ADDICTIVE			
Football Manager	M	£2.50	-
ALTERNATIVE			
Round Ones	-	£1.65	-
ATLANTIS			
Anarchy Zone	M	£1.65	-
Creepy Cave	-	£1.65	-
Golden Figurine	-	£1.65	-
Survivors	-	£2.50	-
BLUE RIBBON			
Steve Davis Snooker	M	£1.65	£2.50
3D Dotty	M	£1.65	-
BUG BYTE			
Dunjunz	M	£2.50	£4.95
Plan B	M	£2.50	-
Plan B2	M	£2.50	-
Twin Kingdom Valley	M	£2.50	-
PLAYERS			
Joe Blade	M	£1.65	-
Joe Blade II	M	£1.65	-

ORDER FORM

MINIMUM ORDER VALUE: In order to preserve these low prices, we can only accept orders having a total value in excess of £4.





24-HOUR TELEPHONE ANSWERING SERVICE FOR ORDERS

Mercury Games

Dept AU1, Unit 3, Sheepscar House, Sheepscar St South, Leeds, W. Yorks.
Tel: (0532) 424712

Please send me:

TITLE	COMPUTER	FORMAT	PRICE
....	....	....	....
....	....	....	....
....	....	....	....
....	....	....	....

(Please list additional titles on an attached sheet).

TOTAL £

*I enclose a cheque/postal order for ....
*Please charge to my Access/Visa card.

My card number is: .... Signature ....

Name ....

Address ....

....

*DELETE AS APPROPRIATE

WINTER SALE

Archimedes

*** ESTABLISHED SUPPLIERS***

	Entry System	Mono System	Colour System
	599.00	649.00	769.00
	699.00	749.00	869.00
	749.00	799.00	919.00
	2119.00	2174.00	2299.00

Unbeatable discounts on all additional hardware & software purchased with any Archimedes system.

MASTER SERIES

Master 128	349.00	Master 512 Module	99.00
Turbo Module	120.00	Econet Module	43.00

ARCHIMEDES UPGRADES/EXPANSIONS

Backplane	39.00	MIDI 512 Module	39.00
ROM Expansion Card	59.00	MIDI Expansion Card	69.00
I/O Expansion Card	85.00	Econet Module	43.00
PC Emulator	99.00	Floppy Disk	115.00
0.5 Mbyte RAM for Archimedes 305			149.00
20Mb Hard Disk + Controller Card (requires Backplane)			499.00

ARCHIMEDES SOFTWARE

Acorn Languages

FORTRAN 77	99.00	ISO-Pascal	99.00
ANSI C	99.00	LISP	199.00
Assembler	199.00	PROLOG X	199.00
Software Developers Toolbox			199.00

Acorn Software

Logistix	99.00	1st Word Plus	79.00
Kermit	49.00	Termulator	59.00

Minerva

Deltabase	26.00	System Deltaplus	59.00
Gammaplot	59.00	Sigma Sheet	59.00
*School Admin	69.00	*Ancestry	69.00
*Accounts Package	239.00	*=Requires System Deltaplus	

Clares

Artisan	34.00	Artisan Supp Disc	17.00
Artisan Gallery	13.00	Pro-Artisan	147.00
Alphabase	43.00	Graphic Writer	26.00
Toolkit	34.00	Toolkit Plus	43.00

Other Software

Pipedream	99.00	Presenter	24.00
Hearsay	60.00	Terramex	17.00

PRINTERS

STAR LC10	169.00	LC10 Colour	214.00
STAR LC24-10	269.00	CITIZEN 120D	119.00
NEC P2200	269.00	PANASONIC KXP1081	139.00
EPSON LX800	174.00	EPSON LQ500	284.00

MONITORS

NEC Multisync	449.00	TAXAN 770 Plus	479.00
PHILIPS 8833	219.00	PHILIPS 8852	249.00



01-650 9152

Telephone for prices on other equipment

Delivery Charge: Computers — £10.00, All others — £6.00
+15% VAT to all orders

To: VMS Enterprises Ltd, Unit 1, Bouverie Lodge, 4 Rectory Road, Beckenham, Kent BR3 1TU

512 users,

Solve the compatibility problems of your MASTER 512 or BBC with co-pro adaptor using DOS+ Problem Solver.

It corrects hardware incompatibilities (such as programmable interrupts' speed, low level keyboard scanning, etc.) and operating system's bugs, enabling the 512 board to run most of the IBM-PC programs that otherwise wouldn't run.
No more inoperative keyboards, halted computers or 'Invalid opcode errors' ...
Lots of hardware dependent programs, including most good games (like Cat, Jet, Digger, ARTWORX's Strip Poker, ELECTRONIC ART's Golf, Invaders, Test Drive, Infiltrator, Quake, Yes Chancellor, Tennis, all versions of MICROSOFT's Flight Simulator, Frogger, 3D Maze, Bushido, Flightmare, Anciant Art of War, etc.) will run like in an IBM PC.
DBASE III plus will now run with all versions of DOS+.
Turbo Prolog , Quick Basic 2.0 , News, PC Tutor and the latest versions of Turbo C will also run correctly.

The program provides the INS, DEL, PG-UP, PG-DOWN, HOME, END and SC-LOCK keys to users who don't have the numeric keypad.
It will also allow you to switch between colour and B&W modes, change the computer's speed and save the hi-res picture on the screen, during the execution of any program.

DOS+ Problem Solver is a resident program and its operation is fully automatic.
It works with all versions of DOS+ other than the SOLIDISK's and makes no changes to your boot disk.

If you need any further informations about DOS+ Problem Solver, please contact SHIBUMI SOFT LTD.

PRICE: £25 inc. VAT, p&p, 5.25" disc & user manual

Cheques should be payable to: SHIBUMI SOFT LTD.

R. Prof. Camara Sinval, 138
4100 PORTO
PORTUGAL

EPSON LASER OFFERS

FAST SERVICE from the EXPERTS. All EPSON Laser printers, consumables, accessories, software, soft fonts, service spares, on-site maintenance contracts — at discount prices.

GQ — 3500 PACKAGE:

GQ — 3500 Laser Printer, parallel interface and cable, Laser Jet emulation, toner cartridge, programming manual, codes sheet, Securicor 24hr delivery, Includes site maintenance (8hr average response time) and TWO FONT CARDS (worth over £200) BONUS for ACORN USERS: FREE FORMS1 form design software SPECIAL PACKAGE PRICE..........£1275 (250 sheet dual paper input tray £200.00 if bought with printer)

ACCESSORIES:

Contact us for low prices on: font cards, memory expansion, Diablo 630 emulation, dual 250 sheet paper tray, software. Our EXCLUSIVE soft font discs.......£55 (EIGHT fonts per disc!) (Ask for full catalogue of fonts)

CONSUMABLES: (EPSON original)

Collector & lens: £79 — with Drum Unit: £139
Toner Cartridge: £18.50 — special offer: FIVE FOR £82

Delivery on all items is FAST and FREE. VAT extra
Cheque with Order (Official Orders welcome)
Write or call for full PRICE LIST and details:

DATATHORN SYSTEMS Ltd. George House, 50 Spring Grove Loughton, ESSEX IG10 4QD. Tel: 01-508 4904

Have you entered our competition to win an Archimedes from Watford Electronics?

See page 79





120D CENTRIONICS
* 120 CPS DRAFT
* 24 CPS NLQ
* FRICTION AND TRACTOR FEED
* 4K BUFFER

£120.87 + VAT = £139



HQP45
* 24 PIN PRINTER
* WIDE CARRIAGE 138 cps
* 200 cps 66 NLQ
* 24K BUFFER

£399 + VAT = £485.85

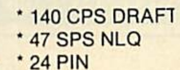
ARCHIMEDES

Prices inc VAT

305 series	* Base	**£699 inc**
	* Mono	**£769 inc**
	* Colour	**£939 inc**
310 series	* Base	**£799 inc**
	* Mono	**£859 inc**
	* Colour	**£1049 inc**
440 series	* Base	**£2528 inc**
	* Mono	**£2587 inc**
	* Colour	**£2764 inc**
PC Emulator	£79 inc	

NEC

P2200 CENTRONICS
* 140 CPS DRAFT
* 47 SPS NLQ
* 24 PIN
* FRICTION AND TRACTOR FEED
* OPTIONAL C.S.F.



£286 + VAT = £329

PHILIPS MONITORS

MONO 7502	£68 +VAT= **£79**
COLOUR 8833	£225 +VAT= **£259**
COLOUR 8852	£259 +VAT= **£297**



LC-10 CENTRONICS
* BUILT IN FONTS
* 120 CPS DRAFT
* 30 CPS NLQ
* 4K BUFFER
* OPTIONAL C.S.F.

£181.73 + VAT = £209

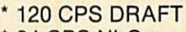
LC-10 COLOUR	£225 + VAT = **£259**
LC24 10	£270 + VAT = **£310**
NX-15	£289 + VAT = **£332**

P.C. COMPATIBLES

ALL AMS PC'S IN STOCK
RICES START FROM **£399**
COMMODORE PC'S IN STOCK
PRICES START FROM **£319**
ATARI PC3 DOUBLE DISK DRIVE, INCLUDES GEM SOFTWARE, MOUSE, MONITOR, KEYBOARD £599 + VAT = **£688**
WE ALSO STOCK OPUS, SAMSUNG

Panasonic

KXP-1081
* 120 CPS DRAFT
* 24 CPS NLQ
* IBM/EPSON COMPATIBLE
* FRICTION AND TRACTOR FEED
* CENTRONICS



£138.26 +VAT= £159

COMMODORE AMIGA

A500 + FREE MODULATOR	**£389 INC**
ATARI, 520 STFM SUPER PACK	**£359**
ATARI, 520 STFM IM DRIVE	**£299**
ATARI, 1040 STFM	**£399**



LAZER PRINTERS

PANASONIC KXP4450
* 300 DPI
* 512K
* SERIAL/PARALLEL
* 1 YEAR WARRANTY

£1564.35 + VAT = £1799.00

CANON LBP-811
* 300 DPI
* 412K
* SERIAL/PARALLEL

£1477.39 + VAT = £1699.00

PRINTERS

OKIMATE 20 A4 Colour Printer, 8K buffer, prints on ordinary and thermal paper. **£120 + VAT (£139)**

JUKI 6000 Daisywheel Printer, amazing value at **£120 + VAT (£139)**

COMPUTERS LIMITED. WHERE TOP NAMES COST LESS!

ALL PRICES SHOWN INC. VAT AND FREE DELIVERY

BARCLAYCARD VISA



BRISTOL: 42 Cannon Street, Bedminster............ Tel: 0272 637981
BRISTOL: 3 North Street, Bedminster.
CARDIFF: 87 City Road............................ Tel: 0222 483069
SWINDON: 31 Farringdon Road .... Tel: 0793 512074/3.

All prices include VAT and free delivery
Mail order from Bristol only

IF YOU LIKE TO RUN YOUR FRANCHISE BUSINESS WRITE TO 42 CANNON STREET, BEDMINSTER, BRISTOL B53 1BN

TECHNOMATIC

Techno House 468 Church Lane, London NW9 8TQ. Tel: 01-205 9558 Fax: 01-205 0190
305 Edgware Road, London W2 Tel: 01-723 0233

Archimedes, BBC COMPUTERS & ECONET REFERRAL CENTRE

To inaugurate our move to the new premises we are offering special deals on Archimedes

(A) **Archimedes 310** (£835) + Colour Monitor AKF11 (£220) National Panasonic KXP 1081 + Lead (£145) + Pro Artisan (£145)
for only **£1055**
A SAVING OF £290 + VAT

(B) **Archimedes 310** (£835) + Multisync Monitor* (£449) + Pro Artisan (£145)
for only **£1159**
A SAVING OF £270 + VAT

(C) **Archimedes 440** (£2529) + Colour Monitor AKF11 (£220) National Panasonic KXP1081 + Lead (£145) + Pro Artisan (£145) + Software Developers Toolbox (£199)
for only **£2649**
A SAVING OF £589 + VAT

(D) **Archimedes 440** (£2529) + MultiSync Monitor* (£449) + Pro Artisan (£149) + Software Developers Toolbox (£199)
for only **£2749**
A SAVING OF £573 + VAT

Add £50 to above prices for PC Emulator
Carriage for any of the above systems £16
*Taxan 770+ or NEC Multi/Sync will be offered at our option
Customers for (B) and (C) will be offered 5% discount on our stock printers.
These offers are valid whilst current stocks last.
If the above do not suit your requirements please contact us.

0% FINANCE

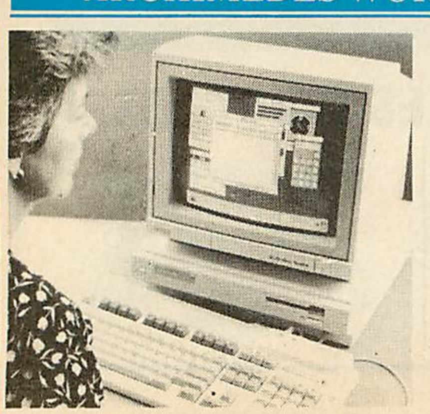


EXTENDED OFFER

Following the huge success of our 0% finance offer, we have decided to extend it by a further month.

Your payments are spread over a 12 month period with no interest to pay. This offer also applies to some of the special deals shown above. Ask for details as you will save £££.....s.

ARCHIMEDES WORD PROCESSING STATION



includes

- Archimedes 310
- ECM 5400 MultiSync Monitor
- Epson LQ500 24 pin Printer
- First Word Plus
- A packet of 3M 3.5" Discs

RRP on above system £1600

OUR PRICE **£1275**

SAVING £325 – over 20% discount
Carriage £16/system

MASTER SERIES

AMB15 Master 128K — **£356(a)**

We include *free* Educational/Fun software bundle from BBC Publications range (RRP £40) and a STARdataBASE package worth another £40.

ADC06 Turbo 65C102 Module — **£115(b)**

Item	Price	Item	Price
ADF10 Econet Module	£49(c)	Acorn Rom Cartridge	£13(d)
ADJ22 Ref Manual I	£14(c)	ADJ23 Ref Manual II	£14(c)
View User Guide	£8.50(d)	V/sheet User Guide	£8.50(d)
TRC2 ROM Cart	£7.50(d)	TRC44ROM Cartridge	£11(d)
TRC32 32K RAM Cart.	£21(d)	Master Dust Cover	£4.75(d)

Item	Price
Acorn IEEE Interface (for B, B+ Master)	£265(b)
Universal CoProc Adapter	£49(b)
BBC Domesday System	£3,750(2×a)

ECONET ACCESSORIES

Item	Price
Stacking Filestore E01S	£999(d)
Filestore Hard Disc E40S	£899(a)
Filestore Hard Disc E60S	£1199(a)

(These will be available in limited numbers during Dec/Jan so order in good time to ensure early delivery)

ECOLINK Card *Full spec on request* — **£269(b)**
(PX/XT/AT interface card for connection to Econet network)

Item	Price	Item	Price
Econet Starter Kit	£85(b)	Econet Bridge	£174(b)
Econet Socket Set	£29(c)	Printer Server Rom	£41(d)
File Server Level II	£75(b)	10 Station Lead Set	£34(d)
Master FS Utility Disc	£17.25(d)		

New RISC OS

The new multi tasking operating system for the Archimedes computers, RISC OS will be released in March/April this year. ***We are able to offer you an introductory price of £29(c) whilst our initial stocks last,*** then we will revert to normal price of £49. Order your set now and be sure of being one of the first recipients of this OS at the concessionary price. Use VISA/ACCESS to order and you will not be charged until we actually despatch the package to you. The package comprises of four ROMs, two Welcome discs containing applications, games and utilities and Welcome and User Guides.

EXPANSION SYSTEMS

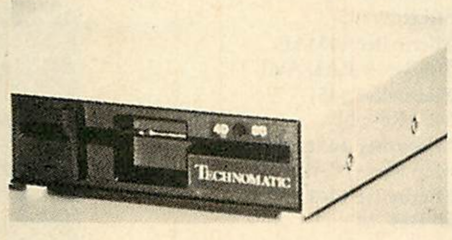
Item	Price
2nd Floppy Drive (305-310)	£118(b)
20Mb Hard disc + Card (305-310)	£469(b)
Acorn Backplane (2 slots)	£37(c)
AtomWide Backplane (4 slots)	£49(c)
TechnoLog Backplane (4 slots) (includes provision for expulsion)	£49(c)
Fan for AW/TechnoLog Backplane	£10(d)
I/O Podule	£80(c)
Acorn ROM Expansion Card	£55(c)
CC Rom Expansion Card	£45(c)
Econet Network Module	£49(d)
MIDI Expansion Card	£66(c)
MIDI Add-on to I/O	£37(d)
IEEE Interface Card	£283(b)
16bit Parallel I/O Card	£195(b)
Dual RS232 Card	£195(b)
Armadilo Sound Sampler	£105(c)
Fourier Transform Software	£40(d)
AtomWide Prototyping Board	£35(d)
ARC/BBC Serial Link	£25(d)
ARC External drive Adaptor	£30(d)
ARC External 5.25" Drive	£90(b)
Arc Printer Lead	£7(d)

All prices ex VAT and subject to change without notice. See page 5 for Carriage Charges.

TECHNOMATIC

Techno House 468 Church Lane, London NW9 8TQ. Tel: 01-205 9558 Fax: 01-205 0190

TECHNOMATIC DISC DRIVES



TS 400

A range of high quality high performance drives to meet the needs of all BBC Micro Users.

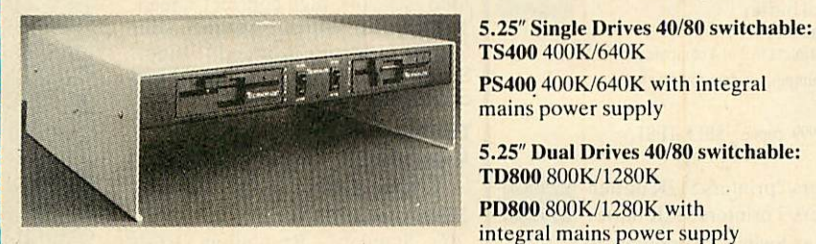
*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering fast track access and head setting times. Our confidence in their quality enables us to offer a **two year parts and labour warranty** on these mechanisms without any extra charge.

*5.25" floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with a suitably fused 13A moulded plug.

*TECHNOMATIC drives stand out from other drives because of the high quality of construction and use of reliable switchmode power supply units on dual drives. High quality of construction ensures that our plinth drives which offer an elegant space solution do not sag or deform under the weight of a monitor.



PD 800P

For users who do not need 40/80 switching capability, please specify as such and add suffix N on our product code. Drive price will be reduced by £5/mechanism.

5.25" Single Drives 40/80 switchable:

Item	Price
TS400 400K/640K	£80(b)
PS400 400K/640K with integral mains power supply	£90(b)

5.25" Dual Drives 40/80 switchable:

Item	Price
TD800 800K/1280K	£165(b)
PD800 800K/1280K with integral mains power supply	£175(b)
PD800P 800K/1280K with integral mainspower supply and monitor stand	£189(a)

3.5" 80T DS Drives:

Item	Price
TS351 single 400K/640K	£69(b)
PS351 3.5" single drive with integral mains power supply in a 5.25" case.	£95(b)
TD352 Dual 800K/1280K	£126(b)
PD352 3.5" dual drive with integral mains power supply in a 5.25" case.	£139(b)

Combo Drives (5.25" & 3.5" drives)

Item	Price
PD853 with integral psu	£180(a)
PD853P with integral psu	£205(a)

DISC DRIVE MULTIPLEXER

For Master, B, B+ and any DFS/ADFS

Item	Price
TDM2 Two computers/one drive unit	£65(b)
TDM4 Four computers/one drive unit	£115(b)

AEDA
ARCHIMEDES EXTERNAL DRIVE ADAPTOR

Technomatic's AEDA provides a reliable external disc drive adaptor with a variety of novel features.

★ It is designed for easy and neat installation and takes only a few minutes to instal. Rear fixing plate is supplied in two halves so as not to interfere with existing expansion boards or those likely to be installed in future.

★ It is fully buffered and allows up to three external drives (3.5" or 5.25") to be connected.

★ Externally located toggle switch allows selecting either internal or external drive as drive 0 or drive A. This feature is particularly useful when booting up from the external drive is required.

★ AEDA is supplied configured for one internal and up to three external drives. On board options allows for reconfiguration to two internal and two external drives.

★ Other on board options allow setting 'disc eject' from the keyboard if the drive is capable of this facility.

Technomatic AEDA £30(c)

MASTER COMPACT

128K RAM, 640K 3.5" DS Drive + Educ software and our bundled Educ/Fun package included

Item	Price
SYSTEM 1 Entry System	£310(a)
SYSTEM 2 with 12" Mono Monitor	£365(2×a)
SYSTEM 3 with 14" Col Monitor	£475(2×a)

Item	Price	Item	Price
2nd Drive Kit	£90(c)	Serial Kit	£25(d)
Mertec Adaptor	£35(c)	TV Modulator	£26(d)
Ext Drive Adaptor	£9(d)	Printer Lead	£7(d)

WINCHESTER DRIVES

Most popular range of Winchesters for BBC at competitive prices.

Single Winchesters, housed in attractively styled metal enclosures in BBC matching beige colour are fan cooled and powered by switch mode power supply for quiet, efficient and reliable operation.

Winchester/floppy combination drives, housed in our elegant plinth housing.

To get the most from the Winchester, the following utilities are installed on the drives:

★ TREE PLAN: A utility to create an organised directory structure and display it on the screen or dump it to a printer.

★ Formatter and verify program.

★ For Master users our popular front end utility to display the entire contents of the drive in icon format. Files can be loaded simply by pointing at the icons.

Item	Price
P30HD 30Mb Winchester	£420(a)
P304HP 30Mb Winchester + 640K DS 40/80T floppy	£609(a)

Larger drives available on request.

UPGRADE KITS

Item	Price	Item	Price
1.20S ROM	£15(d)	ADFS ROM	£26(d)
DNFS ROM	£19(d)	1770 DFS Kit	£49(d)
BASIC II ROM	£22.50(d)	Econet Kit	£55(d)

RAM/ROM EXPANSION

Item	Price
ATPL Board for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms +2*8K RAMS	£37(c)
ATPL Battery backup kit	£18(d)
ATPL Board for BBC+ (10 Roms)	£31(c)

3M FLOPPY DISCS

5.25" Discs in packs of 10

Item	Price
744 40T SS DD	£6.50(d)
745 40T DS DD	£7.00(d)
746 80T SS DD	£12.00(d)
747 80T DS DD	£11.00(d)

(Add £1 for library case packing)

3.5" Discs in packs of 10

Item	Price
80T SS DD	£10.00(d)
80T DS DD	£11.75(d)

BULK DISCS

Item	Price
50 5.25" 40 T single sided discs with sleeves in lockable box.	£25(b)
50 5.25" 80 T double sided discs with sleeves in lockable box.	£32(b)
50 3.5" 80T double sided discs with sleeves in lockable box.	£60(b)

FLOPPICLENE DRIVE HEAD CLEANING KIT

Item	Price
5.25" Kit with 20 disposable discs	£14.00(d)
3.5" Kit with 20 disposable discs	£14.75(d)

DISC STORAGE BOXES

Item	Price
DB340 Lockable 40 × 3.5"	£8.50(c)
DB550 Lockable 50 × 5.25"	£6.50(c)
DB570 Lockable 70 × 5.25"	£8.50(c)
DB5100 Lockable 100 × 5.25"	£10.50(c)

EPROMS/RAMS

Item	Price	Item	Price
2764-25	£2.80	27256-25	£6
27128-25 (12.5vVpp)	£4.50	27128-25 (21vVpp)	£6
27512-25	£9	6264LP-15	£6

These prices subject to change (Carriage code d)

All prices ex VAT and subject to change without notice. See page 5 for Carriage Charges.

TECHNOMATIC

305 Edgware Road, London W2 Tel: 01-723 0233

PRINTERS

EPSON

LX800	£165(a)	LQ500	£265(a)
FX800	£295(a)	LQ850	£415(a)
FX1050	£349(a)	LQ1050	£569(a)
EX800	£399(a)	LQ2550+	£919(a)
EX1000	£530(a)		

GQ3500 Laser Printer £1249(a)

TAXAN KP815 £155(a) TAXAN KP915 £275(a)

Star LC10	£179(a)
Star LC10 Colour	£225(a)
Star LC24-10	£275(a)

NATIONAL PANASONIC
KXP1081* £145(a)
*(*includes Wysiwyg ROM + Master Lead)*

Canon Laser LBP8-II	£1595(a)
Brother HR20 Daisy Wheel	£349(a)
Juki 6100 Daisy Wheel	£295(a)
Integrex Colour Inkjet	£529(a)

PLOTTERS

Hitachi 672XD A3 4 Colour HPGL	£529(a)
Plotmate A4S	£379(a)
Plotmate A3M	£549(a)
Roland 880 A3 Flat bed 8 col	£575(a)

Variety of Plotter pens and accessories in stock.
Larger Plotters available. Please enquire.

PRINTER ACCESSORIES

SERIAL INTERFACES

Epson 8143	£32(d)	Epson 8148 (8K buffer)	£79(d)
Nat Pan KXP17	£39(d)	Taxan	£49(d)

RIBBONS

LX80/86/800, MX/RX/FX80/85/800/850	£4(d)
MX/RX/FX100, FX105/1000/1050	£6(d)
LQ500/800/850	£5(d)
LQ1000/1050, EX800/1000 (Black)	£8(d)
EX800/1000	£16(d)
LQ2550, JX80	£13(d)
StarLC10/NL10, NatPan KXP1081	£4(d)
LC10 Colour	£6.50(d)
Taxan 810/815/910/915	£5.75(d)
Integrex Black Cartridge	£8(d)
Integrex Colour Cartridge	£14(d)
Juki 6100 £1.80(d) Brother HR15/20	£4(d)
HI80 Pens (4) (Aqueous or Oil Based)	£6.90(d)
Hitachi Pens (6) Aqueous £18.50(d) Oil	£25(d)
Colour option EX800/1000	£35(d)

CUT-SHEET FEEDERS

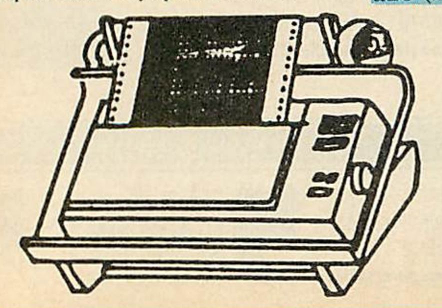
LX800	£70(b)	LQ500	£75(b)
FX/LQ/800/850	£135(b)	FX/LQ1000/1050	£179(a)
EX800	£150(b)	EX1000/LQ2500	£210(a)
Star LC10	£55(b)	Brother HR20	£229(a)

TRACTOR FEEDS

LQ800	£44(b)	LQ1000	£55(b)
LQ850	£70(b)	LQ1050	£85(b)

PRINTER STAND

A new style printer stand with easy paper feed and paper seperation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. **£26 (b)**



PRINTER BUFFERS SHARER & CONVERTERS

TSB 256 Auto Sharer/Buffer
256K buffer with 3 input ports. Each port scanned automatically every 10 secs until data found. PAUSE, COPY and RESET Facilities. Full spec on request. **£169(a)**

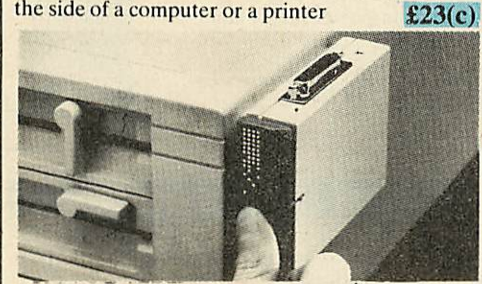
Smart Printer Buffers
Facilities include: COPY upto 265 copies PAUSE, RESET, Self-Test.
For serial: X-on/X-off, ETX/ACK or DTR/DTS protocols independently selectable baud rate for each port

PP256 256K Parallel buffer	£169(b)
SS256 256K Serial buffer	£189(b)

Parallel Multi-Spoolers
Allows connecting 2 printers to 2 or 4 computers
Butter allows quick dumping of data to free the computers
COPY allows upto 999 copies, SELF-TEST, PAUSE, CLEAR

MS422 4computers/2printers 512K buffer	£299(b)
MS223 2computers/2 printers 512K butter	£199(b)

Compact Two Way Switch 2 computers to 1 printer or 2 printers to 1 computer Attaches to the side of a computer or a printer **£23(c)**



Serial/Parallel/Serial Converters
Compact economical converters which support X-on/X-off, ETX/ACK, DTR/DSR protocols

C-PS Parallel/Serial converter	£35(c)
C-SP Serial Parallel converter	£35(c)

Add £49 to above prices for units with 64K butter

Manual Printer Sharers:

(All lines are switched).	Parallel	Serial
2 computers to one printer	£23(c)	£23(c)
3 computers to one printer	£30(c)	£30(c)
4 computers to one printer	£36(c)	£36(c)
2 computers to 1 or 2 printers	£49(c)	£49(c)

Cable sets for above sharers available for all popular computers

BBC Computer Sharer: TCS26
1 computer to 2 printers fitted with BBC cable **£21(c)**

Paper & Labels
Plain fanfold paper with microperforation:

2000 sheets 9½ × 11"	£12(£3.50)
2000 sheets 14½ × 11"	£18.50(£4.50)
1000 Sheets A4 90gsm	£12(b)
500 A4 80gsm Loose Sheets	£3.50(b)

Labels/1000
Single Row 3½" × 1⁷⁄₁₆" (d) Triple Row 2⁷⁄₁₆" × ⁷⁄₁₆" £5(d)
OHP Transparencies A4 (100) £56(b)

PARALLEL PRINTER LEADS

BBC/Master (1.2m)	£5(d)	BBC/Master (2m)	£7(d)
Archimedes (2m)	£7(d)	Compact (1.2m)	£7(fd)

MODEMS

MIRACLE WS4000 V21/23	£129(b)
MIRACLE WS3000 V21/23	£244(b)
MIRACLE WS3000 V22	£379(b)
MIRACLE WS3000 V22 bis	£495(b)
Pace Linnet	£139(b)

(All modems are BABT approved)

BBC Data Cable for WS3000/4000	£10(d)
MIRACLE WS2000V21/23 & BELL stds	£92(c)

MONITORS

12", 14" and 20" MONITORS

Microvitec 1431
Std Res, 14" **£175(a)**

Microvitec 1431AP
Std Res + PAL/Aud, 14" **£199(a)**

Microvitec 1451
Med Res, 14" **£225(a)**

Microvitec 1451AP
Med Res + PAL/Aud, 14" **£219(a)**

Microvitec 1441
Hi Res, 14" **£359(a)**

Philips 8833 14" RGB
Med Res, 14", high contract screen, TTL/Linear input, Mono/Colour Switch Stereo Sound Input. Separate controls for brilliance and contrast. **£219(a)**

Touchtec 501 **£239(a)**

Acorn Philips
14" Colour Monitor **£199(a)**

Microvitec 2030CS
20" Standard Resolution RGB/Comp Video **£380(a)**

Microvitec 2040CS
20" High Resolution RGB/Comp Video **£675(a)**

TAXAN SUPER VISION 620
12" Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible **£269(a)**

TAXAN SUPER VISION 625
12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible. **£319(a)**

TAXAN 770+
MultiSysnc Autoscan 14", ideal for utilising the hi res modes on Archimedes. Our price includes a tilt & swivel stand **£449 (a)**

NEC MultiSync II 14"
Enhanced version of the original NEC MultiSync complete with tilt & swivel base. Suitable for Archimedes and PC compatibles. **£459 (a)**

ECM 5400 14" Multisync Monitor
Fully compatible with Archimedes IPC Systems. Complete with Tilt and Swivel. **£329(a)**

MONOCHROME MONITORS

PHILIPS 7752 NEW
14" green screen monitor.
This is a new addition to the Philips' popular mono monitors. Features include Flat screen, Inverse video switch, separate brilliance and contrast controls. **£85(a)**

PHILIPS BM 7502
Hi Res green screen **£72(a)**

PHILIPS BM 7522
Hi Res amber screen **£79(a)**

Tilt & Swivel Stand for Philips Mono **£6(c)**

MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic monitors)	£17(c)
Monitor Stand Models B & B+	£10(c)
Monitor Stand Master	£13(c)
Double Tier Stand Models B, B+ or Master	£24(b)
Taxan RGB Lead	£7(d)
Microvitec Lead	£4(d)
Monochrome BNC/Phono Lead	£4(d)
Copy Holder Self Supporting A4	£15(c)
General purpose tilt and swivel stand for 12" and 14" Monitors NEW	£12(b)

TECHNOMATIC

Techno House 468 Church Lane, London NW9 8TQ. Tel: 01-205 9558 Fax: 01-205 0190

Archimedes SOFTWARE

LANGUAGES & PROG. TOOLS

Item	Price
ANSI C/ISO PASCAL/ FORTRAN 77	each £95(c)
PROLOG X/LISP	each £175(b)
TWIN Editor	£27(d)
Archimedes Assembler	£185(b)
Software Dev. Toolbox	£185(b)
RISC BASIC Compiler (SV)	£85(c)
Clares Toolkit	£32(d)
Clares Toolkit+	£41(d)

WORD PROCESSORS

Item	Price
First Word Plus	£79(c)
GraphicsWriter	£27(d)
Pipedream	£89(c)
Pipedream Spellchecker	£43(d)

SPREADSHEETS

Item	Price
Logistix	£95(c)
Sigmasheet	£59(c)

ACCOUNTING SYSTEM

Item	Price
Minerva's Suite	each £54(d)

(Order Processing/Sales Ledger/Stock Manager/ Purch. Ledger/Nom. Ledger)

EMULATED PACKAGES

Item	Price
VIEW/Viewsheet/Viewstore	each £47(d)
Interword/Intersheet	each £35(d)
Wordwise	£20(d)

GRAPHICS/ART/CAD

Item	Price
ProArtisan	£145(b)
Artisan	£30(d)
Artisan Support Disc	£17(d)
Auto Sketch	£69(d)
GammaPlot???	£30(d)
System Gamma+	£59(d)
Presenter	£24(d)
SVARC-PCB	£167(b)
SVSolidCAD	£41(d)
SVSuperDump	£20(d)

GAMES

Item	Price
Hoverbod/Missile Control	each £13(d)
Orion/Freddie's Folly	each £13(d)
Zarch	£15(d)
Conqueror	£24(d)
Enthar Seven	£29(d)
Minotaur	£9(d)

DATABASES

Item	Price
Deltabase	£26(d)
System Delta Plus	£59(d)
Prog Ref Guide	£26(d)
AlphaBase	£39(d)

MISCELLANEOUS

Item	Price
PC Emulator	£79(d)
HEARSAY Comms Package	£55(d)
MAYA Terminal Emulator	£49(d)
Control (setup utility)	£13(d)

BBC FIRM/SOFTWARE

INTEGRATED PACKAGES

Item	Price
MEGA 3 ROM	£76(c)
MINI OFFICE II	
Disc for Model B & B+	£14(d)
Disc for Master	£16(d)
Disc for Compact	£19(d)
ROM Version (B,B+, M&C)	£43(c)

(For disc version pse specify 40 or 80T)

UTILITIES

Item	Price
Acorn ADFS ROM	£26(d)
Acorn GXR GRAPHICS ROM (please specify B or B+)	£20(d)
PRINTMASTER	£24(d)
DUMPMASTER	£26(d)
SCREEN PRINT	£25(d)

DATABASE MANAGEMENT SYSTEMS

Item	Price
VIEWSTORE	£36(d)
STARdataBASE	£29(d)
ACORN OVERVIEW (Specify if Compact)	£65(b)
INTERBASE	£49(d)

DRAWING PACKAGES

Item	Price
AMX MOUSE with SUPER ART	£59(c)
STOP PRESS (Pagemaker) (pse specify B, B+, Master or Compact)	£37(d)
EXTRA EXTRA	£ 19(d)
MAX	£14(d)
Stand Alone Mouse	£34(c)
MARCONI RB2 TRACKER BALL	
with ICON MASTER (B, B+ Master)	£59(c)
with CURSON CONTROL ROM (M)	£59(c)
Stand Alone (Specify if AMX compatible version)	£45(c)
Cursor Control ROM (M)	£10(d)
FLEET STREET EDITOR (40T)	£26(d)

WORD PROCESSORS

Item	Price
Acorn View Professional	£50(c)
VIEW 2.1	£35(d)
VIEW 3.0	£45(c)
Double VIEW (ROM)	£20(d)
Double VIEW (Disc)	£15(d)
View Printer Driver Generator	£8(d)
WORDWISE	£24(d)
WORDWISE PLUS	£38(d)
INTERWORD	£36(d)
EDWORD II	£39(c)
WYSIWYG Plus	£15(d)
SPELLMASTER	£42(d)
SPELLCHECK III	£25(d)

SPREADSHEETS

Item	Price
VIEWSHEET	£36(d)
WINDOMATIC (A VIEWSHEET UTILITY)	£15(d)
INTERSHEET	£37(d)
INTERCHART (A GRAPHICS UTILITY)	£25(d)

LANGUAGES

Item	Price
META ASSEMBLER	£90(b)
META DISASSEMBLER	£90(b)
ACORNSOFT C	£29(d)
ACORN MICROPROLOG	£50(d)
ISO PASCAL	£51(c)
ISO PASCAL SAG	£30(d)
OXFORD PASCAL (for B or B+) (pse specify 40 or 80 Track)	£32(d)
OXFORD PASCAL for Master	£49(d)
LOGOTRON LOGO	£49(c)
Advanced BASIC Disc (for B, B+ or Master with 2nd Proc)	£12(d)

COMMUNICATIONS

Item	Price
TERMULATOR (BBC B or B+)	£25(d)
TERMULATOR (Master)	£35(d)
MAYA TERMINAL EMULATOR	£49(d)
COMMSTAR II	£28(d)

BBC PUBLICATIONS EDUCATIONAL SOFTWARE

PRIMARY EDUCATION

Item	Price
Astronomy	£8(d)
Computers At Work Aud/Disc	£16(c)
Picture Craft	£17(d)
Introducing Geography	£15(d)
Maths with a Story I Cass	£5(d)
Maths with a Story II Cass	£5(d)
Number Games Cass	£5(d)
Using Your Computer Cass	£24(d)
The Hall of Mirrors	£13(d)
Geordie Racer	£12(d)
Bird Spy	£8(d)
Maths Aud/Disc	£12(d)

SECONDARY LEARNING

Item	Price
Technology & Design Pt 1	£21.50(c)
Electric Fields	£8(d)
'A' Level Statistics	£19(d)
'A' Level Geography	£13(d)
Inside Information Prog/Cass	£10(d)
Book	£8(d)
Aud	£5(d)
Open Learning Pack D/Aud/Bk	£36(b)
Science Topic (ST): WAVES	£7(d)
ST: RELATIONSHIPS	£7(d)
ST: BONDING	£7(d)
ST: ElecMag. Spectrum	£7(d)
ST: Electronic in Action	£7(d)
ST: Newton & The Shuttle	£9(d)
ST: ECOLOGY	£9(d)
ST: POLYMERS	£9(d)
ST: Classif. & Periodic Tab	£10(d)
ST: Food & Population	£10(d)
Sec Science (SS) Microtech	£7(d)
SS: Mole Concept Disc/Aud	£10(d)

GENERAL

Item	Price
Vu-Type	£7.50(d)
Vu-Type Professional	£19(d)
White Knight Mk II (pse specify Compact or 1770DFS)	£16(d)
Battlefields Cass	£5(d)
A Vous La France Disc	£20(d)
Book	£5.25(d)
Aud (2)	£7(d)
Espana Viva Disc	£19(d)
Book	£6.95(d)
Disc/Aud (2)	£7(d)
Deutsch Direkt Aud	£16(d)
Book	£5.95(d)
Black Queen (1770DFS)	£13(d)
Bismark (1770DFS)	£13(d)

Codes: **Cass:** Program on Cassette
Aud: Audio Cassette
Disc or no Code: Program on disc
Above Programs are suitable for BBC Computers B, B+ & Master

TIME WARP

Real Time Clock, Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application programme. £29(d)

All software in this advertisement has been tested to work with appropriate Acorn Disc Filing Systems only and we are unable to comment on compatibility with any other filing system. It will be the buyers responsibility to verify such compatibility.

Technomatic is an authorised dealer & referral centre for Acorn Products.

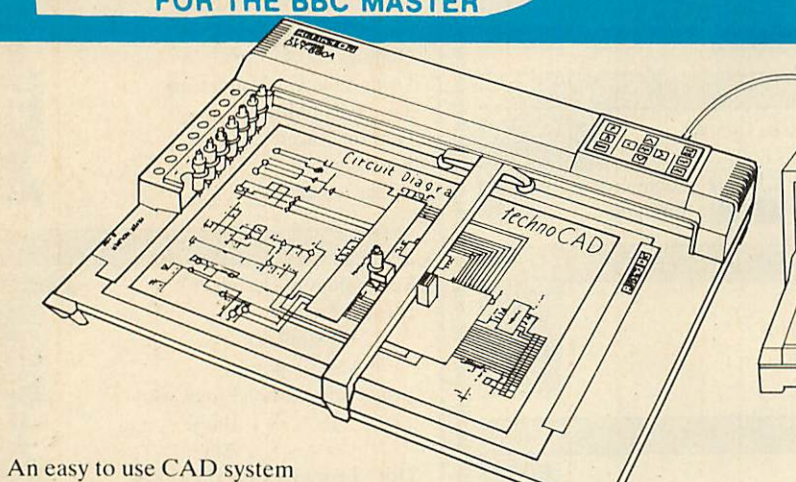
All prices ex VAT and subject to change without notice. See page 5 for Carriage Charges.

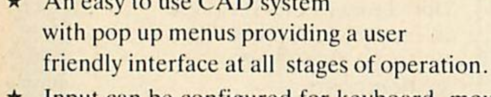
TECHNOMATIC

305 Edgware Road, London W2 Tel: 01-723 0233

technoCAD

COMPUTER AIDED DRAUGHTING FOR THE BBC MASTER





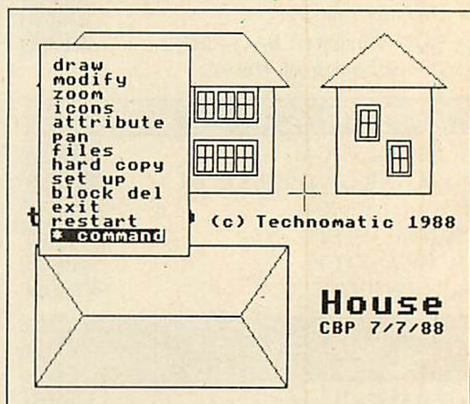
- ★ An easy to use CAD system with pop up menus providing a user friendly interface at all stages of operation.
- ★ Input can be configured for keyboard, mouse or tracker ball. Only three keys to input all commands if input from keyboard.
- ★ Virtually no limit to the size or complexity of the drawing that can be created. Powerful zoom facility allows a A0 size drawing to be viewed from single screen or a single screen can be enlarged to A0 size. Continuous panning across a drawing by specifying co-ordinates.
- ★ Lines, arcs and circles can be drawn with ease and in user defined colour and thickness. These can be modified at any stage of drawing.
- ★ User definable grid and scale, together with on screen display of dimensions, and co-ordinates enable easy and accurate drawings.
- ★ Multi layering capability with 8 levels allows superimposition of drawings.
- ★ Powerful icon utility allows any shape or drawing to be saved to a library as an icon. Icons can be recalled from the library and placed anywhere on the screen drawing at required scale and orientation.
- ★ Toolkit program allows customisation of files, utilities and peripherals.
- ★ Drawings can be scaled on screen to suit the plotter or printer in use. A maximum resolution of 0.01mm is available. Pre-configured drivers for many popular plotters and a driver generator for any BBC compatible plotter is included. Printer drivers for Epson 9 pin and 24 pin printers are included as standard as is the facility for installing drivers for other printers. Printers will output in landscape or portrait format.

FREE EVALUATION DISC AVAILABLE
Phone for your copy
£99(c)

Why technoCAD

The best feature of technoCAD is not its outstanding performance, not its unique ability to allow creation of complex icons, not the quality of output from printers or plotters. The best feature is the unprecedented ease with which it can be mastered. With easy to use single key commands limited to three keys, pull down menus and a clear and concise, easy to read manual, technoCAD is truly the system any one can use.

technoCAD will meet the needs of most professional applications and is an ideal tool for teaching CAD in technical schools, CDT departments and colleges.



BOOKS

No VAT Carriage Code (c)

LANGUAGES

Title	Price
6502 Assy Lang Prog	£10
6502 Programming	£8
8086 Book	£23.95
Acorn FORTH	£8
Acorn LISP	£8
Acorn ISO Pascal Ref Manual	£8
BASIC ROM User Guide	£9.95
30Hr BASIC	£7.50
Intro to COMAL	£8
Master Reference Manual I	£14
Master Reference Manual II	£14
Micro Prolog Ref Manual	£8

BBC MICRO GUIDE BOOKS

Title	Price
Inside Information	£8.95
Maths Prog in BBC Basic	£5.95

ARCHIMEDES

Title	Price
Archimedes Reference Manual	£29.95
Arc. Assy. Lang. Prog.	£14.95
Inside Autosketch	£12

PROGRAMMING/UTILITY

Title	Price
Advanced Sideways Ram User Guide	£8
Advanced User Guide (BBC)	£15.95
New Advanced User Guide	£19.95
Assy. Lang. Prog. BBC	£10.50
Mastering Assembly Code	£6.00
Mastering Interpreters & Compilers	£10.00
Master Operating System	£6.95
Mastering View, Viewsheet & Viewstore	£8.00
View by B. Smith Dabhand	£8.00
View 3.0 Manual	£8.00
Viewstore Manual	£8.00
Viewsheet User Guide	£8.00
Wordwise Plus	£5.00
Understanding Interword	£5.00

SOUND & GRAPHICS

Title	Price
Computer Graphics & CAD Fundamentals	£5.00
Mastering Music	£5.00

DISC DRIVE SYSTEMS

Title	Price
Advanced Disc User Guide	£15.00
Disc Programming Techniques	£7.00
File Handling on the BBC	£7.00
Practical Disc File Techniques	£4.00
Mastering the Disc Drive	£5.00
Mastering DOS plus	£9.00

APPLICATIONS

Title	Price
The Software Business	£2.50

All prices ex VAT and subject to change without notice. See page 5 for Carriage Charges.

TECHNOMATIC
MAIL ORDER & RETAIL
Techno House
468 Church Lane
London NW9 8TQ.
Tel: 01-205 9558
Fax: 01-205 0190

RETAIL SHOPS
468 Church Lane, London NW9 8TQ.
Tel: 01-205 9558 Fax: 01-205 0190
(close to Kingsbury ⊖)
West End Branch
305 Edgware Road, London W2
Tel: 01-723 0233, 01-402 0444
(near Edgware Road Tube) ⊖)

For fast delivery telephone
your order on 01-205 9558
using VISA/Access Card



Orders welcome from
government depts &
educational establishments

All prices ex VAT
Prices are subject to
change without notice
Please add carriage
(a) £8.00 (Courier)
(b) £2.50
(c) £1.50
(d) £1.00

PC COMPATIBLE BOOKS

Title	Price
Using SMART	£22.45
Using Symphony 2nd Ed	£22.45
Advanced Techniques dBASE III+	£22.95
dBASE III Plus Prog Tips/Tecs	£16.95
dBASE III+ Handbook 2nd Ed	£19.95
dBASE III+ Progrmg Tips & Techniques	£16.95
Mastering dBASE III+	£22.95
Understanding dBASE III Plus	£19.95
123 Tips Tricks & Traps	£18.45
ABC's of 123	£15.95
Mastering 123 (2nd Ed.)	£24.95
Using 123 Special Edition	£21.95
Mastering Supercalc 4	£17.95
Advanced Techniques Wordperfect	£18.95
Using Wordperfect W/Book & Disc	£27.45
Wordperfect Tips Tricks Traps	£16.95
ABC's of Word Perfect 5	£16.95
Mastering Wordperfect 5	£12.95
Using Wordperfect 5	£19.95
Introduction to Wordstar	£17.95
Wordstar Prompt	£5.95
Introduction to Wordstar 2000	£17.95
Wordstar Prof Complete Reference	£24.95
ABC's of Autocad	£20.95
Inside Autocad	£32.45
Inside Autosketch IBM	£12.50
Mastering Ventura	£22.95
Publishing Power with Ventura	£22.95
Ventura Tips and Tricks	£18.95
Turbo Basic Programs	£19.95
Advance C Techniques and Applications	£19.95
Advanced C Programming	£19.10
C At A Glance	£7.95
C Programming Lang 2nd Ed	£24.95
C The Complete Reference	£21.95
Solutions in C	£17.25
Turbo C Complete Reference	£24.95
Using Turbo C	£19.95
Advanced Turbo Prolog	£19.95
Introduction to Turbo Prolog	£19.95
Advanced MS DOS (Microsoft)	£19.95
DOS Instant Reference	£9.95
DOS The Complete Reference	£21.95
Mastering DOS Vers to 3.3	£19.95
MS DOS Encyclopedia to 3.2	£95.00
MS DOS Handbook (3rd Ed.)	£18.95
MS DOS Quick Reference (3.2)	£3.95
PC Magazine DOS Power Tools	£39.95
DOS Plus Reference Guide	£12.95
Understanding UNIX	£20.45
Understanding Unix 2nd Ed	£19.45
UNIX Programming Environment	£21.70
Unix The Complete Reference	£22.95
Programmer's Guide to Windows	£21.95
Using Sidekick Plus	£21.95

Professional Software Developers Tools for BBC Universal Development System

A set of three packages to meet the needs of any software developer for assembling, disassembling and emulating codes for over 30 processors. Packages are structured to work with new processors.

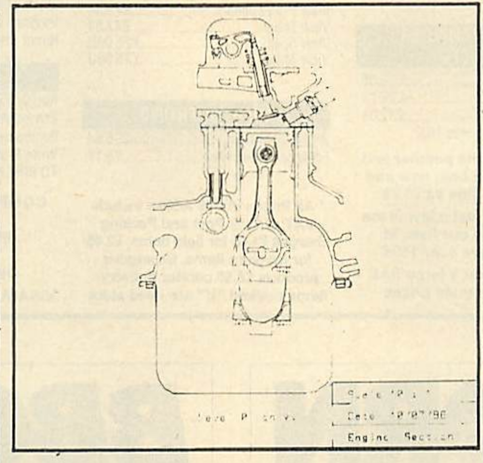
Full details on request. This is what Acorn User had to say about the assembler.

"All the good features you would expect to find in a good source code editor are present ... Meta assembler lives in a different world. It is structured to work with any new processor ... as new instruction sets can be added ... as needed ... has a well featured editor with colour highlighting, a sound modular approach." Acorn User October 1986

NOVACAD Computer Aided Draughting System

Novacad can drive a plotter to produce drawings of highest quality... Novacad is excellent. It is flexible, genuinely easy to operate without much practice, and a pleasure to use. Beebug Dec 86

A sophisticated CAD package with unique facilities. Thousands of Novacad packages are being used in widely differing fields ranging from industries for producing engineering drawings to accountants offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing high quality output are making extensive use of Novacad's unique features. Novacad is proving to be an invaluable teaching aid in technical schools simply because of the ease with which it can be used.



Novacad is compatible with all models fitted with Acorn DFS. Hardware requirements can be minimum; single drive and FX80 compatible printer are enough to get started, though its performance is enhanced considerably by use of 6502 2nd processor, dual drive and to a degree with B+ and Master's shadow ram.

The major features offered are:

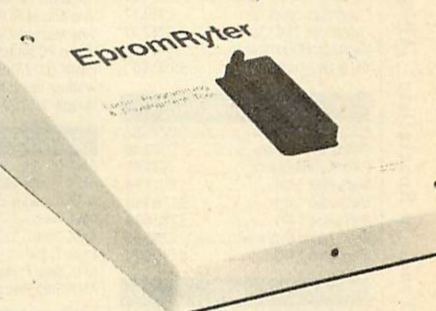
★ Simple and easy to use with logical command sequence.
★ A large drawing area (approx 15 screens)
★ Unique ability to create complex icons made up of upto 500 lines instead of the usual 15 to 20 pixels, store them in a library and recall them at different scales and orientations.
★ Zoom facility.
★ Create multi level drawings.
★ Text entry at any 90° orientation anywhere on the screen.
★ Grid scaling and locking, displacement measurements.
★ Printer routine for FX80/100 compatible printers
★ Cursor control from keyboard/tracker ball/mouse.

Plotter driver generator available as an optional utility, configures a routine for any BBC coompatible plotter. Pre configured routines for popular plotters like Epson HI80, Hitachi, Plotmate are included. Drawings can be scaled to maximumm plotter size.

NOVACAD T/M Version	£49(d)
NOVACAD T/M + Plotter DG	£61(c)
Plotter Driver Generator	£15(d)

EpromRyter

***Highly sophisticated & Advanced Programmer**
***All current single rail eproms handled**
***State of the Art Programming Algorithms**



EpromRyter is a powerful eprom programmer designed for use with the BBC Master Computer. It takes full advantage of the latest developments in the eprom technology and the extra facilities on the Master to provide fast, simple and efficient programming and editing facilities.

The software is totally menu driven and on screen help messages make the programming simple for both specialists and novices alike.

The EPROMRYTER interfaces with the Master through 1MHz bus. It is mains powered with its own psu. 3M Textool zif socket has been fitted to ensure consistent and reliable service over long periods.

The single rail eproms handled by the EpromRyter are:
● 2716 2732 2764 27128 27256 27512 27513 27011 2516 2532 2564 (NMOS & CMOS)
● One time eproms P27XXX, 87CXXX etc.
● Also A suffix eproms such as 27XXXA

£89(b) + VAT

EPROMER II

A proven Eprom programmer for BBC Model B and B+ with thousands in use in industry, educational and R&D establishments. It offers many of the powerful features of the EpromRyter and can program all single rail eproms upto 27256. Full details on request. **£89(b)**

This advertisement can only show an example of the range of products stocked by Technomatic. So send for our latest BBC catalogue providing detailed information and prices on BBC Computer Systems, Peripherals, Software and Books. To obtain your free copy please complete and return the coupon below.

Technomatic is a BBC Computer and Econet Referral Centre providing a professional and reliable service to the BBC user.

NAME ....

ADDRESS ....

....

..................Post Code ....

1/89

Return to Technomatic Ltd, Techno House, 468 Church Lane, London NW9 8TQ.

All prices ex VAT and subject to change without notice. See page 5 for Carriage Charges.

COMPUTECK "The Trade-in Specialists" **APPROVED ACORN DEALERS**

ARCHIMEDES

	Basic	Mono	Colour
A305	707.36	768.08	930.01
A310	845.02	905.74	1067.66
A310M	905.74	966.46	1128.36
A410	1415.78	1466.38	1618.18
A440	2559.33	2620.05	2781.98

★★★★★★★★★★★★

The above are NEW prices for the Archimedes – All Discounted!!

We are Licensed credit brokers & offer 0% Finance on Archimedes.

For range of podules etc Ring!

- * Master 128 .... £394.61
- * Compact series from £353.17
- Cambridge Z88 Lap Top £267.37
- Sec/User BBC B's from £199.00
- 6502 Sec Processors £103.50U

MONITORS

- Philips 8833 Colour £275.82
- Philips 8852 Colour £309.46
- Philips 7502 Green £83.65
- Microvitec 1431 .... £211.64
- Microvitec 1451 .... £189.75U
- Microvitec 1441 .... £230.00U
- Kaga Taxan Sup/v III £395.98
- Microvitec 1431 .... £149.50U

PRINTERS

- Panasonic KX P1081 .... £169.00
- Panasonic KX P1082 .... £243.80
- Citizen 120D £149.50
- Epson LX800 .... £268.80
- Epson LQ800 .... £539.05
- Micro P135+ £159.36
- Seikosha SP180AI £138.00

NIDD VALLEY PRODUCTS

- Digimouse mouse only £28.40
- Digimouse+Graphic £35.91
- Digimouse+Illustrator £40.39

*** We Specialise in Trading in Used Hardware & Software also we will buy in certain Software & Hardware**

*** Anything we have for almost Anything you have**

***** NEW LAMPS FOR OLD!!! *****

LASER PRINTERS

- Epson GQ3500 laser £1692.68

VARIOUS HARDWARE

- Music 500 .... £23.00U
- ATPL Sideways ROM Board £41.50
- Cambridge Z88 32K RAM £18.95
- Cambridge Z88 32K ROM £18.95
- Cambridge Z88 128K RAM £47.43
- Cambridge Z88 128K ROM £47.43
- Cambridge Epson Eraser £37.95
- Cumana Touch Pad £34.50U
- Graph Pad £69.00U
- Morley AA Board £43.64
- Peartree MR4800 128K RAM £57.50U
- Pace Nightingale Modem £69.00U
- Ferguson TV tuner £55.00
- Vine Micros ROM Board 3 .... £17.94
- Vine Micros ROM Board 4 .... £26.94
- Viglen PC Kit for BBC B £23.00U
- Prism 200 Modem £40.25U
- Watford Quest Mouse £18.00U
- Miracle WS200 Modem £69.00U

ADVANCED MEMORY SYSTEMS

- AMX Design £62.98
- AMX Mouse+Superart+OS £71.94
- AMX Superart £44.94
- AMX Max £12.00U
- AMX Desk £15.00U
- Extra Extra! £15.00U
- AMX Stop Press £44.98
- AMX Stop Press £33.00U

DATABASE SOFTWARE

- Mini Office disc 5.25 .... £12.70
- Mini Office disc 3.5 .... £16.45

ADVANCED COMPUTER PRODUCTS

- Adv. Control Panel £32.08
- Adv. Disc Investigator £26.73
- Adv. Disc Toolkit £32.08
- Plus all ACP products less 10%

**** We Stock ALL the popular and unpopular games both new and used from as little as £1.72**

*** The above are just a few of the items we have on our lists, at present we have over 1500!**

Please tel. or send a large SAE for up to the minute prices

DISC DRIVES

No PSU Drives:

- Ahkter 40/80 400K Single £118.95
- Ahkter 40/80 800K Dual £229.44
- Cumana CSX400 Single £138.54
- Cumana CDX800S Dual £256.45
- Pace PSD3 Single £137.13
- Pace PDD3 Dual £254.86
- Single Drives 40T £46.00U

With PSU Drives:

- Ahkter 40/80 400K Single £131.69
- Ahkter 40/80 800K Dual £276.20
- Cumana CS400 Single £161.95
- Cumana CD800S Dual £305.94
- Pace PSD3P Single £161.71
- Pace PDD3P Dual £302.73

Hard Disc Units:

- Ahkter 20meg HD2000 .... £539.94
- Ahkter 40meg HD4000 .... £809.94
- Viglen 20meg Drive 0 .... £584.07
- Viglen 28meg Drive 0 .... £395.00U
- Viglen 40meg Drive 0 .... £940.49
- Viglen 40meg Drive 1 .... £737.08

ACORNSOFT

- ISO Pascal for Master £134.50U
- C Language £51.75U
- S Pascal BBC B £20.70U
- Logo £39.00U
- ISO Pascal ROM £55.20
- Lisp £18.40
- Logistix (Archimedes) £102.46
- Micros in Business £39.95
- Twin (Archimedes) £30.00
- View 2.1 .... £34.00U
- View Index £11.96
- View Plot £23.95
- View Professional £79.94
- View Sheet £47.84
- View Spell £23.00U
- View Store £36.80U

WIGHT SCIENTIFIC

- Wight Signwriter £26.94
- Fonts for above each £5.17

*** All Prices in this Advert include VAT at 15% Post and Packing charges £1.00 for light items, £2.45 for medium items. Expensive products £8.50 courier delivery. Items marked "U" are used stock**

BEEBUG SOFT USED SELECTION

- C Language £29.50U
- Murom £13.80U
- Master File II Disc £11.50U
- Printwise Disc £14.95U
- Quickcalc Disc £11.50U

* We stock the complete range of Beebug Soft all Discounted

CLARES MICRO SUPPLIES

- Alpha Base (Archimedes) £44.94
- Artisan (Archimedes) £35.95
- Toolkit (Archimedes) £35.95
- Brom BBC £11.50U
- Macrom £17.25U
- Fontwise 5.25" package £17.25U
- Fontwise 3.5" package £30.59

COMPUTER CONCEPTS

- Inter-Base £55.20
- Inter-Chart £29.44
- Inter-Sheet £45.08
- Inter-Word £34.50U
- Inter-Chart (Archimedes) £23.00
- Inter-Sheet (Archimedes) £35.88
- Inter-Word (Archimedes) £35.88
- Mega 3 ROM £87.99
- Spell Master £47.19
- Wordwise Plus £30.00U
- ARM Ass Lang Book £11.65
- ROM podule Arch Bat/Back £64.44

DABS PRESS

- Master Guide Book £11.65
- Viewstore/Sheet Book £11.65
- View Guide Book £11.65
- Master Emulator ROM £11.50U
- Program Discs for books £7.14
- Hyper Driver £26.49

VINE MICROS

- Replay Tape to Disc £26.91
- Romboard 3 .... £17.94
- Romboard 4 .... £26.94
- Write Protect Switch £8.05
- TD ROM for BBC B £13.80U

COMPUTECK Ltd. Dept. (AU)
I.O.O.F. House
69 High Street West
Glossop
Derbyshire SK13 8AZ
VISA/ACCESS Tel. 04574 65953

MINERVA SYSTEMS

- System Delta+Card Index £58.45
- Deltabase (Archimedes) £26.94
- System Delta Plus (Archimedes) £62.95
- Accounts Packages all 10% Disc.

PERMANENT MEMORY SYSTEMS

- Genie in a Box £71.41
- Genie Junior £22.49
- Genie Master Cartridge £71.41
- Genie Utilities £8.94
- Genie Real Time Clock £26.08
- 6502C B2P Sec Processor £80.95

Introducing three titles under our own label "SENSIBLE SOFTWARE" Introductory Price *£14.95* each

The Menu

Displays both sides of a disc on scrolling window; Auto LOADS BASIC, M/Code & WP files; File handling made easy; Shows all 16 ROMs; Loads ROMs automatically in SWR and save to disc. This is what a !boot file was made for.

The List

Auto selects DFS/ADFS; Allows 39 chars. description of files so months later you know what a file was and where it is; ADFS path route shown and routine made easy; Printout of all data to keep in each disc envelope.

The Label

The ultimate Label printer, Bold, NLQ, Condensed, Enlarged, U/Lined etc. WYSIWYG on screen editing; Auto duplication from one to print as many as you want; Configures to many label sizes and numbers across. If you print labels this is a must!

*** We are mainly Mail Order but personal callers are welcome to collect goods and arrange for demonstration of computers and accessories. Please telephone to arrange an appointment.**

BBC ACORN USER

MAGAZINE

14 issues for the price of 12

SUBSCRIPTION ORDER FORM

Please return this form to Caroline Gregory, *BBC Acorn User* Subscriptions: Redwood Publishing Ltd, 20-26 Brunswick Place, London N1 6DJ

Please enclose a cheque/postal order for £18.95 made payable to **Redwood Publishing Ltd** or quote your Access/Visa number.

YES! I wish to subscribe to *BBC Acorn User* magazine starting with the______issue.

NAME ________________________

ADDRESS ________________________

POSTCODE ____________

Please charge my Access/Barclay Card

ACCOUNT NO: EXPIRY DATE

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ UK ONLY ☐☐☐☐

SIGNED ________________________

BBC ACORN USER

MAGAZINE AND MONTHLY DISCS

Just £55 for 12 magazines and 12 monthly discs

SUBSCRIPTION ORDER FORM

Please return this form to Caroline Gregory, *BBC Acorn User* Subscriptions: Redwood Publishing Ltd, 20-26 Brunswick Place, London N1 6DJ

Please enclose a cheque/postal order for £55 made payable to **Redwood Publishing Ltd** or quote your Access/Visa number

YES! I wish to subscribe to *BBC Acorn User* magazine and 5.25-inch monthly discs starting with the______issue

NAME ________________________

ADDRESS ________________________

POSTCODE ____________

Please charge my Access/Barclay Card

ACCOUNT NO: EXPIRY DATE

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ UK ONLY ☐☐☐☐

SIGNED ________________________

HINTS & TIPS

MIRROR IMAGES

Reflect your screen in Basic, cut and paste text, get more out of your Master 512, use Screen to check View files, and more besides

David Atherton

£5 REFLECTION IN BASIC

Andrew Pepperell from Louth has the *Acorn User* Graphics Utilities Disc, and is understandably impressed with the machine code routines written by my Agora colleague David Acton for reflecting certain parts of the screen. As an exercise, Andrew set out to see if he could do the same thing in Basic. The result is in the yellow pages.

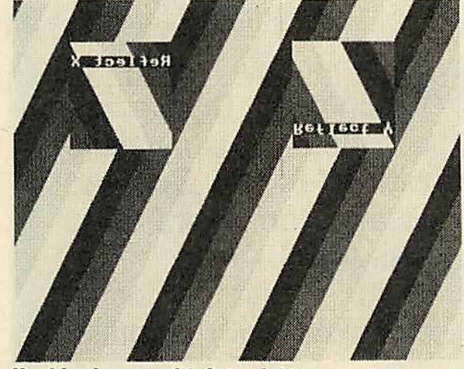
The program, which comes with a short demonstration, has two procedures, PROCreflectx and PROCreflecty. These take four arguments, being the left, bottom, right and top co-ordinates of the area to be reflected.

One procedure is called to produce a mirror-image of the screen, reflecting it left to right. The other flips the screen image upside-down.

PROCreflectx reflects the contents of the screen area defined around the X axis – a left to right mirror image. PROCreflecty reflects around the Y axis – to give upside-down pictures. The four parameters are passed to the procedure in the order given, as shown by L%, B%, R% and T% in the procedure definition.

The procedures work by taking a row (or column) of pixels, and reading in from each end and then swapping them over. This is repeated for each row (or column) until the whole block has been reflected. The step in the FOR..NEXT loops, which is set to 4 in the example listing in the yellow pages, should be altered to 2 for a mode 0 screen, or 8 for modes 2 and 5.

The program is not terribly fast, but it is completely legal, and thus will work on any BBC machine, including an Archimedes, and should even work on the various BBC Basics which are available for other computers.



Upside-down and left to right

£5 VIEW SCREEN COMMAND

A short tip from James McBride of Muirkirk involves the use of the Screen command in *View*. This displays a file, correctly formatted on screen. James points out that, like Print, this command will display a file directly from disc without corrupting memory contents. So if you are working on one file, but want to look at another one, you can type SCREEN <filename>. James uses this when he's writing a document, but can't save it because the disc catalogue is full. By SCREENing the files, he can check if any can be deleted. Or you could use it to read the text – say to check on a reference to an old letter.

Another tip offered by James to achieve the same end is to permanently keep a file called V. Last on the disc, which is a dummy file that you can delete as a last resort. I use a similar system with the name 'temp', with a golden rule that if I ever save anything with the name temp, I immediately deal with it in some way, by renaming or knowing that it has no further use. My discs are littered with 'temp' files which get deleted in my !BOOT file, or overwritten by the next temp file I create.

£10 EDIT QUICKIE

A small quickie on using Master *Edit* to deal with pound signs (£) in text files generated by the IBM PC, the Master 512 or Archimedes. On these machines, the ISO standard pound sign, Ascii number 163, is used.

To replace this with a BBC-compatible pound sign, load your text file into *Edit*, and type f5 and then CTRL-f3, followed by '/£'. This will perform the replacement correctly, as CTRL-f3 happens to generate code 163.

This month's disc contains a bonus file, IBMFONT, which you can *Exec to redefine the character set of a Master 128, or even a BBC B with a second processor. It makes the on-screen font the same as that used by the IBM PC, or an IBM-compatible printer. The set includes a number of graphics characters useful for drawing boxes.

£15 CUT AND PASTE ROM

Yet another interesting program from Brian Ross, for the Electron and Master series only, is a cut and paste ROM. This provides a simple method of copying a block of text within any text editing or other program. It emulates the 'clipboard' facility found on computers like the IBM PC and Apple Macintosh. With this you can mark a block of text within the program, and 'cut' it out (actually 'copy' it, as the original text is not deleted) and 'paste' it back in again.

A similar facility already exists in wordprocessors such as *View*'s 'copy marked block' option – but this program is easier to use, will cut a true rectangle from the screen (rather than an area from

Meet the Morley Family...

Teletext Adapter

The adapter is housed in a plastic disc drive style case, similar in colour to the BBC micro. It connects to the User Port via a 4-way ribbon cable and can take its power either from the computer or from our optional power supply.
The unit comes with the ATS (advanced teletext software) written for us by the BBC. The HOLD PAGE and REVEAL features are implemented, and pages can be saved to disc under your own file names.
Telesoftware is catalogued and selected from the Menu page, and the programs are easily downloaded.
THIS IS THE BIGGEST SELLING TELETEXT ADAPTER CURRENTLY IN PRODUCTION WORLD-WIDE, AND COMES WITH A FULL MONEY BACK SATISFACTION GUARANTEE.

Adapter BBC/Master	£104.20
Adapter Compact	£120.00
Adapter RML Nimbus	£104.20
Optional Power supply	£8.80
Teletext Utility Disc	£5.20

EPROM Programmer V2

This state-of-the-art unit, allows programming of 2764, 27128 and 27256 EPROMS both 12.5 and 21 volt. Totally under software control it is believed to be one of the fastest programmers available today.
The comprehensive user-friendly software included in the package has two main parts. The first allows EPROMS to be read, programmed, verified, and edited, also allowing a ROM image to be loaded or saved. The second is a full ROM management system in its own right, which has a host of useful features and routines, such as KILL and RESURRECT ROM to disable or enable a sideways ROM, dump ROM image to buffer or disc, move ROM image in buffer to sideways RAM, and VIEW-SEARCH any sideways ROM.

£30.00

Eprom programmer utility disc – Put all your favourite routines into Sideways Rom, both BASIC and M/Code allows multiple programmes up to 16k with separate * commands for initialisation and help.

£5.20

Master Board "AA"

At long last the add-on all MASTER users have been waiting for, an internal ROM board.
No more need to turn the computer off to insert the cartridge containing the ROM you need to debug the program in memory.
The all new MORLEY MASTER BOARD "AA" allows you to have up to 8 x 16k and 4 x 32k extra Roms installed inside your MASTER and still leaves the cartridge slots free. This in effect allows your MASTER to support as many as 24, 16k ROMs installed permenantly, with the addition of your standard 4 x sideways ram banks and four banks by using cartridges.
A staggering 32 ROM images installed and accessible at any time.
Included in the package is a utility ROM which has many useful features including a clever file transfer program that transfers files between DFS and ADFS formats or vice versa.

£40

The Latest Arrival...

The Morley range of Winchester Drives are completely compatible with all BBC's, B+'s and Master computers fitted with ADFS.
Each unit comes complete with a utility disc containing format, verify, archive, initialise and an intelligent file copy including DFS files to hard disc.
Finished in high quality colour co-ordinated case with a whisper quiet internal fan and switch mode power supply.
Superb quality and competitive cost – in a word – "Morley"!

20 Megabyte	**£370**
30 Megabyte	**£420**
40 Megabyte	**£500**
60 Megabyte	**P.O.A.**

RAMDISC

Due to the rise in prices of dynamic RAM chips we only have a limited stock of the 1 megabyte version of this device left.
Special offer price while stocks last.

£150.00

Master Cartridge

from Care

Dual cartridge 2 sockets	£9.00
Quad cartridge 4 sockets	£14.00
Duet cartridge 2 x 32k sockets	£12.00
32k non-volatile ram cartridge ideal for Spellmaster dictionary	£33.00

Software

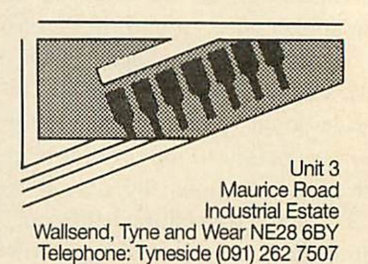
We now stock a full range of computer concepts software and will gladly populate your 'AA' board or cartridge before despatch.

Master Smart Cartridge

THE MORLEY/CARE SMART CARTRIDGE
The Smart Cartridge will at the press of a button halt a program running in memory and execute any one of a host of useful built-in, or user defined procedures, and once completed will return to the program and continue where it left off. The only limiting factor with this device is the programmers imagination.
Some of the built-in features (at the press of a button):
*Autosaves comnputer's entire memory.
*Freeze program at any point.
*Screen dump (any mode) to printer or disc.
*Allows most protected software to be backed-up including tape to disc and disc to tape.
*User friendly menu driven software etc.

£30.00

MORLEY
E·L·E·C·T·R·O·N·I·C·S



Unit 3
Maurice Road
Industrial Estate
Wallsend, Tyne and Wear NE28 6BY
Telephone: Tyneside (091) 262 7507

VAT: UK customers please add 15% VAT to cost incl. carriage.
CARRIAGE £1 on all orders. £3 on larger items (Adapters etc).
To order:
By Post:– Enclose cheque made payable to Morley Electronics Ltd. Or credit card:
By Phone:– quoting your Access Visa number.
Goods usually despatched by return.
Government and Education orders welcome.

COMING SOON...

Master Speech Cartridge

start to finish of text), and best of all, will allow you to paste the selected text into a different application, as the text is preserved when you change programs. So, for example, you could copy some text from *View* to *Wordwise*, without using a disc.

The text is kept in sideways RAM, and the program once again runs as a ROM image, so you must have sideways RAM fitted to use it. Type in the program from the yellow pages and run it; a ROM image file called 'Cut' will be created. This should be loaded into sideways RAM in the usual way, and initialised with CTRL-Break.

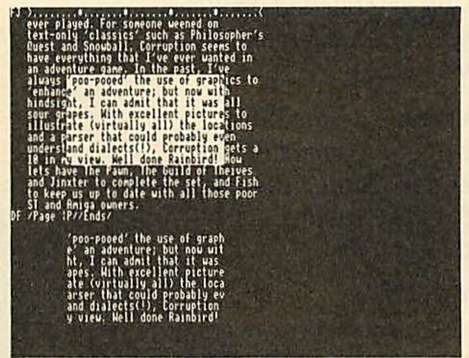
Then within any program, when you have text on the screen which you wish to select, press CTRL-Shift-G. An asterisk will appear at the top left-hand corner of the area to be selected – the asterisk should actually sit on top of the first character – and press Return. Then use the cursor keys again to move to the bottom right-hand corner of the rectangular area being selected. You will notice when you move the asterisk that a hash character is left behind to denote the top left-hand corner.

When you have positioned the asterisk on the bottom right-hand corner, on top of the last character to be selected, press Return again. The cursor will flash rapidly across the selected area, and then both markers will disappear, and the cursor will return to the original position it held before the cut.

The text is now stored, and you can carry on. You may wish to paste it in immediately or, perhaps, continue with other operations.

Pasting the text back into an application is much simpler. Just move your cursor to the place you wish to paste to and press CTRL-Shift-H. The text will appear at the cursor position. Note that at the end of each line of the rectangular area, the pasting routine will place a carriage return. Also, the area stored is an exact rectangular area, including spaces, and in some text editors, this may cause odd effects. The message is: to avoid embarrassing mistakes, practise before you need to do it for real.

The routine can only work with recognisable text characters. This is normally straightforward with the *View* family and *Wordwise*, but the routine will not work with *InterWord* if you are using the special 53 and 106 character screen modes. Also the program suffers from the same problem that the first version of *Acorn User*'s own PrtSc program had – that characters other than those in current text colours (normally white on black) are not recognised. With the cut and paste ROM, they are converted to asterisks.



Cut and paste a rectangle of text

Once the text is pasted, the paste routine is disabled, meaning that the text can only be pasted back once. You could, however, alter the program so that the text can be repasted more than once. Also, the cut routine is disabled once some text has been cut – to avoid overwriting. In other words you must paste it back somewhere before you can cut again. Again this could be altered.

Further enhancements are possible such as sending the contents of the clipboard to disc or printer, or even altering the text in some way. Finally take care not to press any keys other than the cursors and Return while setting up the rectangle, or these keys will get mixed in with the pasted text.

Possible uses for the program include easy transfer of *ViewSheet* and *ViewStore* information into *View*, or similar operations with the *Inter* family. Also, you can replay a series of Basic or star commands – make sure that you copy from one character in from the left, so you don't include the prompt.

Note that the program will work on the Electron and Master series micros, but it won't on the model B. This is because the key sequences required make use of the interrupt polling system provided in the Electron and Master OS, activated by *FX22, which the model B does not contain.

The program works by initialising polling, and then at each poll, testing whether CTRL and Shift are being pressed. If so, a test is made for G or H. If G is pressed, then the cut routine is activated. If the buffer is empty, the polling is turned off to avoid re-entry, and the cursor position and text window definition is stored. The asterisk may move freely around the entire screen, but the original cursor position and text window will be restored on exit. The key control routine then allows the top left position to be set, and then the bottom right position. These are stored in 'ulx', 'uly', 'lrx' and 'lry' respectively. The text in the block is then read, moving the cursor with VDU 31 and reading each character with Osbyte 135.

Top-bit set characters are not stored, even when they are valid defined characters, as bit 7 is used to denote that a character is the last on the line.

The end of text is marked with &FF, which cannot be confused with an end-of-line character, as &7F, the character which &FF would represent on the end of the line, is Delete. As each byte is read it is stored in the Cut buffer, which is the area in sideways RAM immediately after the program code. After storage, the original screen and cursor position is restored.

The routine move_cur which controls cursor movement does not use Osrdch as this won't work inside a polling routine. Therefore the keyboard is read directly using Osbyte &7A, and delay loops are introduced to slow down keyboard repeat. These delay loops may have to be reduced on the standard Electron, or increased for a Master. Brian has set the values for his own Turbo Electron. To reduce the delay, increase the value (currently 0) of the number loaded into X at labels 'rdkdel' and 'd12', eg, LDX#128 would double the repeat speed. To increase the delay, introduce more NOP instructions at these points.

The Paste routine works after detecting the key sequence by redirecting the polling routine to fetch one character at each poll. It would not be possible to output the entire buffer during one poll, as this would take far too long within an interrupt routine.

As each character is fetched, it is decoded to see if we have reached an end-of-line or end-of-text byte.

With the former, a character 13 is inserted. When &FF is found, the paste routine is disconnected to stop further characters being output, and ordinary keyboard monitoring is restored. Unlike Cut, there are no screen windows or

cursors to restore. The way Brian has written the program makes it very easy to alter the action of the Paste routine. So, for example, you could output a space rather than a carriage return at the end of each line.

£10 MASTER 512 TIP

The Master 512 is a topical subject these days, with huge numbers of the boards being sold since the price was reduced to £99. Martin Brewer of Redruth has a BBC system with a Solidisk real time clock and a Master 512 board fitted in a Watford co-processor box. He has found that the 512 software as issued can't read the time from the Solidisk clock; despite the time being available, it still has to be typed in every time. After much fiddling about, Martin has found that if a single byte is patched, DOS Plus will read the time from the Solidisk system.

The alteration that needs to be made is on the 512 boot disc. Before you start, make a backup copy of the disc, using the menu-driven disc copy program supplied with the 512, and work with the backup so that if anything goes wrong you still have your original disc. You will then need to use a BBC-based disc sector editor such as Pres's *ADT* or *ADI*, BBC Soft's *Monitor*, or the DOS-based editor in C Snee Computer Services' Master 512 Utilities pack.

Using the editor, move to track 10, sector 4, (decimal) and locate byte &86 (hex). This byte should be &03 – it appears like this:

```
0080 FF EB 32 FD 80 FB [03] 74 ..2....t
```

Change the byte to &01, and resave the sector back to disc. Now reboot the Master 512 using the disc you have altered. You should now find that the computer no longer asks for the date and time, but enters DOS with the correct date and time set by the Solidisk clock. Typing Date or Time as DOS commands will confirm this.

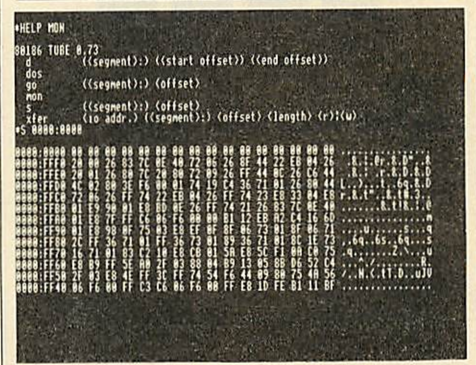
Solidisk has discontinued its clock. Martin doesn't say whether this also works on the *Genie Watch* system from PMS, which is the only real time clock now available. As the *Genie Watch* supports the standard Osword calls, I see no reason why it should not.

Another tip for Master 512 users concerns the use of function keys while in DOS. On normal PCs, the f3 key repeats the last DOS command typed, the f1 key repeats individual characters, and f6 outputs an End-of-File character. On the Master 512, these useful features are not available when the system boots; various keywords appear when function keys are pressed.

However, if you load a second copy of the COMMAND. COM file – the program which actually handles DOS input – then the standard IBM definitions are available. To do this, simply type COMMAND at the DOS prompt, with disc 1 in the drive.

Note however that this uses up about 27k of DOS memory, and so some programs may not run correctly.

£5 MASTER 512 MONITOR



***HELP MON gives these commands**

While on the subject of the Master 512, Friso Dijstelbergen of Eastbourne, New Zealand, reminds those who didn't know that there is a built-in memory monitor in the Master 512 ROM. If you start your 512, and press Break when DOS is loaded, the screen should clear and report the standard second processor message, and filing system, and give you a star prompt. You can also just type *Configure Tube, and press Break without a DOS disc loaded. If you now type *Help Mon, a list of commands will appear. These are 'd' to dump a block of memory (like *Dump), 'f' to fill memory, 'go' to execute *Go, 's' to edit memory using the cursor keys, 'sr' to search for a string, and 'tfer' to transfer memory between the 80186 and the 6502. An additional command *Dos loads DOS Plus from the boot disc without the need to press CTRL-Break. There isn't room here to describe how to use the functions for 80186 programming, but clearly there is a lot to explore here. The syntax of each command is given in the help messages. If you are new to 80186 memory mapping, you can start exploring using *S 0000:0000.

£5 SHORTER FUNCTION KEY PROGRAMS

JP Jakubovics of Oxford has written to me to explain how the various one-line Basic programs that have been covered over the last couple of months could have been stored more efficiently by entering the coded 'token' for each Basic keyword. So if you want to program a key with the command PRINT TOP-PAGE to find the length of your current Basic program, then typing *K.0P.TOP-PA.|M is certainly shorter at 10 bytes. But *K.0|!q|!8P–|!|P|M achieves the same effect using six bytes, because the single byte tokens (TOP is the token for TO, plus a P) replace the two to three byte abbreviations. The *Key command decodes the coded GSREAD sequences when you enter them, compressing for example |!q into a single byte, value 241, the token for PRINT.

Of course it is difficult to remember the numbers and to read codes appropriate to the tokens. But there is an easy way to program keys in this fashion, using the interpreter itself. Type in the line of code you wish to assign to a key as the first or only line of a program, ie, 10PRINTTOP-PAGE using as compact a form as possible, omitting spaces where you can – you don't have to use abbreviated forms though. Then to assign this line to f0, type: OSCLI ("Key 0"+$(PAGE+4)+"|M") The key will be assigned and you can now delete the program line. Pressing f0 will produce a strange set of characters on screen, but it will work, and the length of the current Basic program will indeed be printed out. This works because the text of the first line of a Basic program is always stored (in tokenised form) at PAGE+4. And as each Basic line ends in a carriage return, the string indirection operator $ correctly picks it up.

All submissions - hints, tips, programs or simply ideas - should be sent to Hints and Tips, BBC Acorn User, *Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ.*

ARC AGORA

BACK UP YOUR TROUBLE

An example of how to archive a hard disc and a module for finding pathnames

David Acton

Those of you who glanced over the Abuser page last month may have heard the sorry tale of my hard disc.

Alas, my replacement disc is going through the same difficulties, but not before I had finished the hard disc archiver program which forms the bulk of this month's column.

In fact, listing 1 on the yellow pages is not just for hard disc owners – network users might also find it useful for storing data away on floppies.

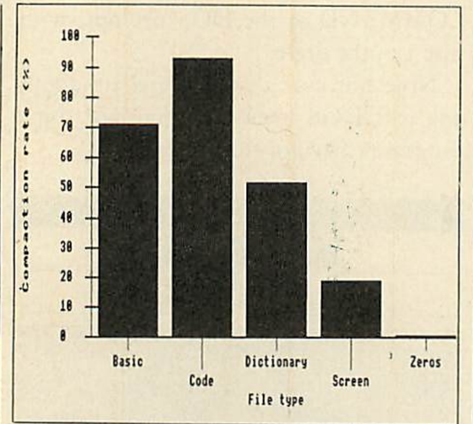
There are two main problems with making backup copies of hard disc files. First, the sheer quantity of data stored on a hard disc is often enough to fill over twenty 800k discs and this brings to light the problem of which files to put on which discs. Second, very long files may be stored on a hard disc or network; if a file grows beyond 800k it clearly cannot be copied onto a single floppy disc – it must be split into parts manually. Listing 1 gets around these two problems using a tried-and-tested technique.

The idea employed is to combine all of the files being archived into a single giant file – spread over as many discs as possible. You are prompted to insert a new blank disc when needed, and these are numbered sequentially so that recovery of files is made easier.

Once I'd written the simple form of the achiver it seemed a shame not to use the immense processing power of the Archimedes to 'squash' the data so that fewer floppies are required. My guess is that discs are especially valuable commodities in schools and colleges.

On a trial run, the finished listing 1 reduced the size of a mixture of files from two megabytes to just over one – this has a potential saving of 12 discs when archiving the contents of a full 20Mb hard disc drive.

Once you've typed in listing 1 (or bought it on the monthly disc), run the program and you'll be presented with a simple menu. Press 'A' to archive a directory onto floppies, 'R' to recover a previously archived directory or 'Q' to quit the program.



Compaction rates of typical file types

On selecting 'A' you'll be asked which directory you wish to archive. By default this is 'adfs::4.$' – that's the root directory of most people's hard discs. To back up your network you might delete the default name and enter "net:$" instead. You should be able to archive a directory from anywhere (other than the drive you are storing the copy on). To permanently change the default name simply alter the first line of the definition of PROCarchive. Next you will be prompted for the number of the floppy disc drive to which you wish to archive – '0' by default.

Finally you will be asked whether you wish the data to be compacted. Answering 'Y' will probably reduce the number of floppy discs required and will not alter the files in any way. However, even the Arc takes a little time to compact files so press 'N' if you have plenty of discs and are in a hurry! You will then be asked to insert a fresh disc at the start of the proceedings and periodically during the archiving process. If the disc you insert is unformatted you will be asked if you would like it formatted – press 'Y' if you are sure. Note that discs are always formatted as type 'D' (800k) although you may use pre-formatted 640k discs if you like.

If there are any files on the disc you insert, you will be asked if they may be deleted. If not, press 'N' and insert a blank disc instead. The program only allows you to archive onto empty discs.

As the files and directories are encountered their names will appear on the screen, indented to indicate the directory structure. If a file has been compacted, the compaction rate is shown as a percentage in brackets after the filename. If a file cannot be archived for any reason (a hard disc error for example) an error message will be shown. Depending on the error, this may invalidate the backup – please check any such files and delete them if they are unwanted.

You will be told when the archiving process is complete, and the menu will be shown again. Make sure to number your discs in the order they were used.

To recover an archived directory, selected 'R' from the menu and insert the first disc of your archive. Press Return and, if the disc is valid, you will be told when the archive was made. You will also be given (as default) the original directory name (adfs::4.$).

If you wish to put the files back in a different place, simply delete the name given and enter your own. You will be prompted to insert discs periodically. Each disc is labelled by the program, so if you accidentally insert the wrong disc you will be asked again. Note that the recovery will fail if a file of the same name as one being retrieved already exists and is locked. Enthusiastic readers might like to embellish the program to

get around this feature; lazy readers should just unlock or delete such files if they dare.

Archiving is performed by PROCarchive and recovery by PROCrecover. A simple, recursive approach is used to trace a path through the tree of files and directories. All available memory is used for archiving and it's divided into two equal areas. One is loaded with original data, the other receives compact data where appropriate. The particular approach used means that files can only be compacted if they fit entirely into one of these blocks of memory.

If you ever encounter the error 'Insufficient workspace' when recovering files, it means that Basic hasn't as much memory to use as it did when the archive was made. In this case, you'll need to reconfigure the machine appropriately – reducing ScreenSize, SpriteSize and so on to whatever they were before.

The compaction system used is one of 'common strings'. Typically, text files are compacted by looking for common strings such as 'ing', 'tion' or 'the'. But our archived files may be of any type – not just text but Basic programs, machine-code or data of some other kind.

You cannot rely on specific English sequences of characters. So, instead, the program looks back in the file being compacted to see if the characters coming up have been used before. In fact it checks the last 256 characters for a similar sequence. If it finds one, it is encoded as two or three bytes of information depending on the length and location of the repeated characters.

This process takes some time, but it is performed by the machine-code routine .comp for maximum speed. Expansion is much more rapid and is taken care of by the routine .expand.

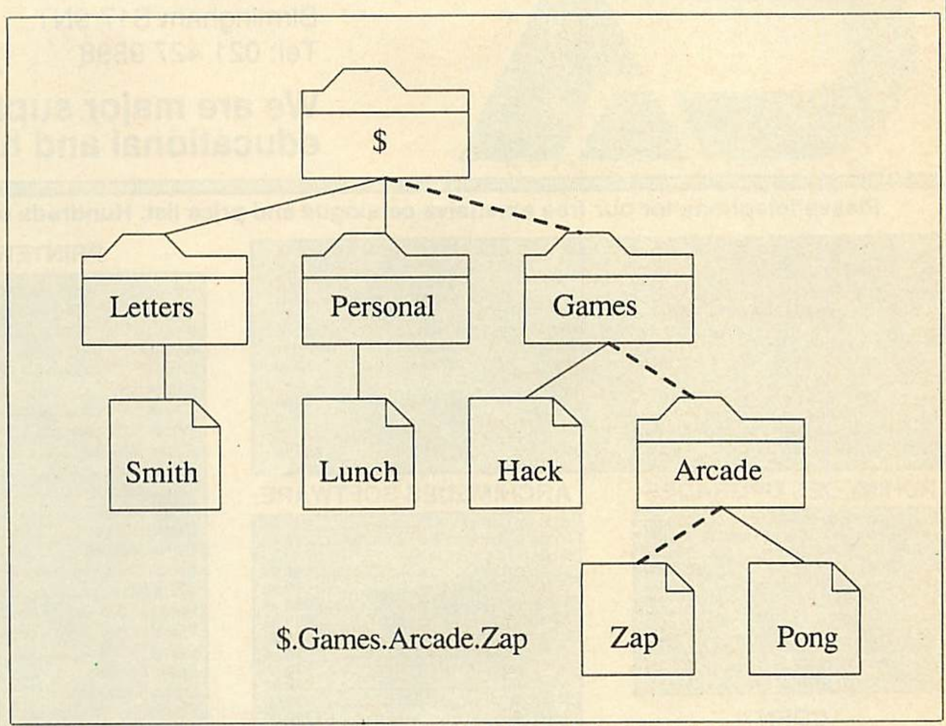
The diagram opposite illustrates the compaction rates of several examples of typical file types. A file consisting entirely of zeros obviously compacts the best, to about 10 per cent of its original size. A machine-code file I tested went down to 93 per cent which is 7 per cent better than nothing.

For those interested, the archive file format is fairly straightforward. Each file 'segment' is called '$.Backup' and begins with an 'archive name' string. This consists of the time and date of the archive followed by '/' and the disc's number in the archive sequence. Objects are preceded by a code byte: 1 for a file, 2 for a directory and 3 for the end of a directory. The last '$.backup' file is terminated with a 255.

After a code byte of 1 or 2 comes the file or directory name. In the case of files, this is in turn followed by 16 bytes of file information (date stamp, attributes etc) and then a compaction byte: 0-uncompacted, 1-compacted.

Uncompacted files follow this byte immediately while compacted data is always preceded by a four byte value which indicates the length of the file in its compressed form.

There are many ways in which you might like to enhance listing 1. It would be nice just to be able to archive a single file, or output the combined data to a file other than '$.Backup'. This latter idea might be employed prior to sending the data via electronic mail for example. I use a similar program on a model B to compact data sent via SJ Research's InterSpan system. If you do come up with improvements of your own, do send them in to Agora.



It's easy to see the complete pathname of the Zap file by following the dotted line

PATH FINDER

Once again we've just got enough room for a David Lawrence quickie – you'll find it appears as listing 2 on the yellow pages. If you've ever managed to get lost in your own directory tree this listing could prove to be your only means of escape. The program assembles a module (which, for purely historical reasons David has called 'BroomCupboard'). This module supports the single command *PathName.

Typing *PathName by itself will display the full pathname of the current directory – appending a directory name will then take you into that directory and show its full name.

Those of you unfamiliar with modules might like to look back at previous Agora pieces on the subject. The main pathfinding code starts at .path.

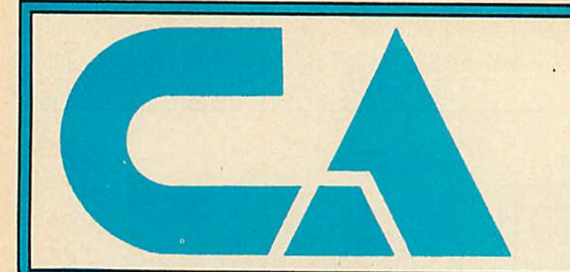
The pathname is built up by reading the current directory name and then issuing a *Up command until the $ directory is finally reached.

The SWI call "OS_GBPB" with R0=6 provides you with the directory name and then you can use the same call with R0=5 to return the disc name to finish the job off properly.

Finally, you are returned to the directory shown using "OS_FSControl" (that's the call used by *Dir).

The BroomCupboard module is a good example of how to claim workspace for a module. It needs 512 bytes of workspace in which to build the pathname.

Please send your programs, ideas, hints and tips to: Arc Agora, BBC Acorn User, *Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. Published items can yield up to £20 for their creators.*



Computaccount (UK) Ltd
11 High Street, Harborne
Birmingham B17 9NT
Tel: 021 427 9898

We are major suppliers to the educational and health sectors

Please telephone for our free extensive catalogue and price list. Hundreds of products listed at excellent prices.

Archimedes

THE NEW RISC COMPUTER FROM ACORN. A VERY FAST 32 BIT MACHINE, SPECIFICALLY AIMED AT THE EDUCATION MARKET COMPATIBLE WITH MOST EXISTING BBC SOFTWARE

	Base model	+ Mono monitor	+ Colour monitor
Archimedes 305 *512k RAM, 512K ROM, 1Mbyte 3.5" drive*	£699	£749	£899
Archimedes 310 *As 305 but 1024k RAM*	£749	£799	£959
Archimedes 440 As 310 but 4048k RAM 20Mbyte hard disc & Floating point option	£2399	£2479	£2629

ARCHIMEDES UPGRADES

Item	Price
Archimedes Reference Manual	£29.95
Archimedes Podule Back Plane	£39.00
Archimedes ROM Podule	£56.00
Archimedes I/O Podule	£78.95
Archimedes Midi I/O Add-on	£39.00
Archimedes Midi Podule	£69.00
Archimedes Econet Podule	£43.00
Archimedes PC Emulator	£95.00
Archimedes .5 Mb RAM for 305	£149.00
Archimedes Floppy Drive Unit	£125.00
Archimedes 20Mb Hard Disk	£469.00

ACORN

Item	Price
Master 128	£379.00
Master 512K upgrade	£99.00
Compact entry system	£345.00
Compact TV system	£355.00
Compact with mono monitor	£379.00
Compact with colour monitor	£525.00

BBC/MASTER ACCESSORIES

Item	Price
RS 232 Interface for compact	£26.00
Extra 3.5in drive for compact	£99.00
PAL TV adaptor for compact	£26.00
Master Econet module	£43.47
Turbo upgrade	£108.00
64K upgrade kit for B+	£34.74
Level 1 file service	£86.00
Level 2 file service	£199.00
File Store E01	£799.00
File Store E02 (20mb)	£595.00
Master ROM/RAM cartridges	£11.95
Acorn DNFS kit	£84.00
1770 upgrade kit	£43.43
ADFS ROM	£26.04
CONCEPT Keyboard	£124.95
View manual	£10.00
Viewsheet manual	£10.00
Master Reference Guide	£14.95

DISC DRIVES

Item	Price
Opus 5802 400k DS 40/80 track	£125.00
Opus 5802D dual 400k DS 40/80 with PSU	£260.00
Opus DDOS kit	£59.95
Pace PSD3P 400k 40/80T with PSU	£144.00
Pace PDD3P dual 400k 40/80T with PSU	£260.00
Akhter MD802E dual 400k DS 40/80T mounted in monitor stand	£285.00
Cumana CS400S 400k DS 40/80T with PSU	£152.00
Cumana CD800S dual 400k SS 40T with PSU	£295.00
Cumana CS354 SS 3.5" with PSU	£121.70
Cumana CD358 DS 3.5" with PSU	£210.00
Cuman CCD2000S 3.5" + 5.25" with PSU	£282.17

ARCHIMEDES SOFTWARE

Item	Price
System Delta Plus Database	£69.95
System Gamma Plus Graphics	£69.95
System Delta Account (per module)	£64.95
School Administrator	£79.95
Video Rental	£69.95
Newsagent	£69.95
Clares AlphaBase	£49.95
Clares Image Writer	£29.95
Archimedis Tool Kit Module	£39.95
Ansic	£99.00
ISO Pascal	£99.00
Assembler	£199.00
Logistix	£99.00
Kermit	£49.00
Twin	£29.00
Zarch	£17.35
Conqueror	£19.95

MONITORS

Item	Price
Mono	
Philips green Hi-res 7502	£85.00
Colour	
Microvitec std-res 1431	£191.00
Microvitec med-res 1451	£229.00
Microvitec hi-res 1441	£399.00
Philips 8833 RGB Med-res + composite video	£251.00
Monitor cables (state type required)	from £3.50
Master Monitor bridge single height	£25.00
double height	£28.00

PC'S

Item	Price
AMSTRAD	
PC2086 HD Mono	£995.00
PC2086 HD Hi-res Colour	£1295.00
PC2086 DD Mono	£745.00
PC2086 DD Hi-res Colour	£1095.00
PPC 640	£479.00
PPC 640 D	£599.00
PCW 8256	£299.00
PCW 8512	£449.00
PCW 9512	£499.00
OPUS	
PC3 HD Mono	£995.00
PC4 HD EGA	£995.00
PC5 HD Mono	£1349.00
MICROVITEC	
PC 4	£965.00
PC 5	£1395.00

SOFTWARE:
Call for full list of IBM Compatible and Amstrad software

AMX

Please state whether for BBC or Master

Item	Price
AMX mouse with Super Art ROM	£78.00
Stop Press	£43.43
Paintpot	£13.00
Desk	£21.70
Super Art ROM	£43.43
Database	£21.70
Utilities	£13.00

PRINTERS

Item	Price
DOT MATRIX	
Amstrad DMP 3250	£189.00
Amstrad DMP 4000	£349.00
Amstrad LQ 3500 24 pin	£345.00
Amstrad LQ 5000 24 pin 288cps	£440.00
Citizen 120D	£149.00
Citizen 180E	£225.00
Citizen MSP 15E	£299.00
Citizen MSP 40	£385.00
Citizen MSP 45	£485.00
Citizen MSP 50	£485.00
Citizen MSP 55	£649.00
Citizen HQP 40	£459.00
Citizen HQP 45	£559.00
Citizen Col. Kit for MSP 50/55 + HQP 40	£60.00
Epson LX800 150cps 80col NLQ	£205.00
Epson LQ500 24pin + paper park	£327.00
Epson FX850	£345.00
Epson FX1050	£440.00
Epson EX800 (optional colour)	£457.88
Epson EX1000 (optional colour)	£614.63
Epson LQ 850 180cps 24 pin matrix NLQ	£479.00
Epson LQ 1050 180cps 24 pin 132 col NLQ	£659.00
Star NX 15 NLQ 132 col 120cps	£349.00
Star SD15 NLQ 132col 160cps	£415.65
Star NB24 15 NLQ 24 pin 216cps	£683.00
Star NB15 NLQ 24pin 300cps	£764.00
Star ND 15 180cps	£440.00
Star NR15 240cps 136col	£529.00
Star LC10 Mono	£220.00
Star LC10 Colour	£259.00
Star NB24-10	£349.00
Brother 1109 Par + Ser 100cps + NLQ	£211.50
Brother 1409 Par + Ser	£349.00
Brother 1509 Par + Ser 180cps + NLQ	£449.00
Brother 2024 Par/Ser NLQ 24pin 160cps	£750.00
Panasonic KX-P 1081	£279.00
Panasonic KX-P 1090	£233.00
Panasonic KX-P 1092	£315.00
Panasonic KX-P 1592	£405.00
Micro-P MP165 NLQ	£208.70
Micro-P MP200 *NEW*	£299.00
Parallel printer cable BBC	£9.00
Parallel printer cable IBM etc from	£15.00
DAISY WHEELS	
Brother HR20	£399.00
Brother HR25	£480.00
Brother HR40	£995.00
Juki 6000	£179.00
Juki 6100	£299.00
Juki 6200	£454.00
Juki 6300	£694.00
Citizen Premier 35	£599.00
Panasonic KXP3131	£299.00
LASER	
Epson GQ3500	£1450.00
Citizen Overture	£1390.00
Brother HL-8 Mutli Emulation	£1895.00
Star LP-8 Lazer Printer inc maint	£1995.00

BBC ROM SOFTWARE

Item	Price
Computer Concepts	
Wordwise Plus	£40.00
Printmaster	£25.00
Accelerator	£48.00
Speech ROM	£27.50
Spellmaster	£46.00
InterWord	£48.00
Intersheet	£48.00
Interchart	£28.50
Interbase	£59.00
Acorn	
View 3.0	£63.00
ViewPlot (Disc)	£25.75
ViewSpell	£33.50
Viewsheet	£45.00
Viewstore	£45.00
GXR (please state whether for B or B+)	£23.00
ISO Pascal	£52.00
LISP	£39.00
BCPL	£46.00
Logo	£52.00
ADFS	£26.04

ACCESSORIES

Item	Price
Epson FX 100/105 Sheet Feeder	£139.00
Brother HR sheet feeder	£209.00
Epson MX/RX/FX 80 Ribbons	£2.95
Epson MX/RX/FX 100 Ribbons	£4.50
Canon PW 1080/1156 Ribbons	£5.00
Taxan Kaga KP810 Ribbons	£5.00
Citizen printer ribbons	from £3.65
All Epson Spares available	£POA
Listing Paper (Box 2000)	from £13.10
Disks 5.25" DS/40/80 Box of 10 inc Library Case	£15.00
Lockable Disk Storage Box	£9.50
Printer Stands 80 col	£19.95

Massive range of other compatible ribbons available

BOOKS

BBC
MASTER
ARM
ARCHIMEDES
MS DOS
VIEW
WORDWISE ETC. . .

SPECIAL SOFTWARE

Torch Turbo Library £45.00
functions and procedures for Turbo Pascal to access the power of Torch/BBC facilities

dBase special £45.00
dBase helper program now available for those who want to access the powerful facilities in dBase, without having to learn how to program in dBase

Personalised Gift Vouchers Now available

HOW TO ORDER

Payment by cheque to:
COMPUTACCOUNT (UK) LTD

Carriage: Items less than £50: £2.50, £50-£100: £4.50
Carriage and insurance on items more than £100: £9.50

Please add VAT at 15% to Total, including Carriage

NAME ....
ADDRESS ....
.... Tel: ....

Quantity | Item | Price
.... £ .... £ ....
.... £ .... £ ....
.... £ .... £ ....

Total £ ....

Send to Computaccount (UK) Ltd., 11 High Street, Harborne, Birmingham B17 9NT
or Telephone 021-427 9898 with your Access details
(No cash by post please)

Watford Electronics

Jessa House, 250 Lower High Street, Watford WD1 2AN, England
Tel: Watford (0923) 37774 Tlx: 8956095 Fax: 01 950 8989

Acorn — The choice of Experience

Shop Hours: 9am to 6pm (Mon.-Sat.) Thursdays 9am to 8pm

All prices exclusive of VAT; subject to change without notice & available on request.

Credit Card Orders (ACCESS & VISA) Tel (0923) 33383 or 50234 (24 Hours)

WE — The choice before and after the experience



micro

Winter Sale

System	Basic	Mono	Colour
305	£565	£614	£734
310	£672	£720	£845
310M	£725	£774	£895
440	£1999	£2055	£2189

(Securicor carr. £10 on Archimedes)

ACCESSORIES

- NEW Multitasking RISC OS £29
- 0.5 Mb RAM for 305 £139
- ROM Podule Acorn £56
- ROM Podule (Computer Concepts) £45
- ROM Podule (C C) with Battery Backup £59
- 2 Podule Backplane + Fan (Acorn) £37
- 2 Podule Backplane (Watford) £25
- 4 Podule Backplane (Watford) £38
- Backplane FAN only (for Hard Disc) £9
- 2nd 800K Floppy Drive (305/310) £118
- I/O Podule (with Analogue port, User port, & 1MHz bus) £80
- MIDI add-on to I/O Podule £37
- MIDI Expansion Card £65
- Sound Sampler (Armadillo) £104
- Chromalock Podule £280
- 20 Mb Hard Disc & Controller Card £469
- Watford's latest 20 Megabyte Hard Disc, Controller Card & Utilities Software £379
- Econet Network Board £40
- Archimedes IEEE Interface Adaptor £269
- Dual RS232 Podule £195
- 16 bit parallel I/O Card £195
- PC Emulation Pack incl. MSDOS 3.21 £65
- Archimedes Reference Manual £29
- Artm Assembly Lang. Prog. Manual £12

WORDPROCESSORS

Wordwise +	£18	Pipedream	£89
Image Writer	£25	P. Spellchecker	£48
Interword ROM	£35	View	£49
1st Word Plus	£75	Viewspell	£32
Archie Spell Master	£49	ViewIndex	£12

DATABASES

AlphaBase	£39	Flying Start II	£80
Viewstore	£49	System's Delta+	£60

SPREADSHEETS

Intersheet ROM	£35	Viewsheet	£49
Sigmasheet			£59

BUSINESS GRAPHICS

GammaPlot	£59	Interchart ROM	£25

INTEGRATED PACKAGES

Logistix – Database, Spreadsheet, Time Management & Business Graphics £94

GRAPHICS, ART & DESIGN

Artisan	£31	Gamma Plus	£60
Pro Artisan	£140	Graphic Writer	23
Support Disc	£16	Autosketch	£69
Toolkit (Beebug)	£32	Toolkit (Clares)	£31
Arc Termulator	£56	Zarch	£16
Alerian	£12	Conquerer	£20
Minotaur	£11	Missile Control	£13
Kermit	£46	Enthar Seven	£29
Archeffect	£20	Arc PCB Designer	£82
ArcTFS	£25	Lingenuity Presenter	£24

Computer Concepts' Archimedes Software on DISC

Inter-Word Disc	£27	Inter-Sheet Disc	£27
Inter-Chart Disc	£17	Spell-Master Disc	£48

LANGUAGES

ANSI 'C'; ISO-PASCAL; FORTRAN 77;	£94 each
Cambridge LISP; PROLOG X	£181 each
LOGOTRON LOGO	£55
BASIC Compiler	£89
Archimedes Assembler	£189
TWIN EDITOR	£27

MINERVA's Archimedes Software

Sigmasheet	£57	Gammaplot	£57
Deltabase	£24	Sys Delta+	£57
Sys Delta + Ref Manual			£25
Order Processing*	£53	Sales Ledger*	£53
Stock Manager*	£53	Purchase Ledger*	£53
Nominal Ledger*	£53	Reporter	£20
School Administrator			£66

*** Requires System Delta**

Archimedes to BBC SERIAL LINK

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers. Using this package it is possible to transfer any data from the BBC to Archimedes at upto 19200 baud.

Only £15

Archimedes 5¼"/3½" Disc drive Interface

With this interface it is possible to connect almost any 5¼"/3½" disc drive with its own power supply to the Archimedes. NO SOLDERING is involved. Supplied complete with necessary lead.

Only £21

Note: This is not simply a lead. Attempting to connect an external disc drive by direct connection may result in damage to your Micro.

New

Watford's 20Meg Archimedes Hard Disc

Watford Electronics' 20Meg hard disc fits internally into the Winchester slot provided. It is fully compatible with Acorn's hard disc upgrade, (the only difference is our low price). The price includes the Hard Disc Drive, Controller Podule & fitting instructions. P.S. This upgrade requires a backplane and a fan.

Type Arch-HD20	£379
Backplane for 2 Podules	£25
Backplane for 4 Podules	£38
Slimline Quiet Extractor Fan	£9



CREDIT TERMS now available. Please telephone or write in for further information.

BBC MASTER

MASTER 128K Micro incl. Acorn's: View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus £35 worth of FREE OFFER (see below) **£345**

FREE . . . £35 worth of Software

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control. With every BBC Master purchased from us this month.

BBC MASTER with Turbo Board + above SPECIAL OFFER £474

512K Processor Add on Board "inc. Mouse and GEM package" **£119**

BBC MASTER plus 512K 80186 Co-processor Board (incl. Mouse and GEM package) plus the above £35 worth of SPECIAL OFFER £475

Securicor Carriage on Micros £7

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module	£118
Econet Module for the Master	£40
Twin ROM Cartridge for Master	£8
Quad ROM Cartridge for Master	£12
Universal Processor Adaptor	£75
Master Reference Manual I	(No VAT) £14
Master Reference Manual II	(No VAT) £14
Master Advance Ref. Manual	(No VAT) £18
64K Upgrade Kit for B+	£32
Acorn 1770 DFS Kit complete	£49
ECONET Upgrade Kit for BBC	£42
ALL ECONET UPGRADES Available	
ARIES' Professional IEEE Interface	£238
Morley Teletext Adaptor with ATS Rom	£99
Filestore E01S £899 Filestore E40s	£799
Filestore E60S £1080 Ecolink	£270

BBC MASTER COMPACT

System 1	Standard Package	£305
System 1A	System 1 + TV Modulator	£329
System 2	System 1 + Green Hires Monitor	£359
System 3	System 1 + Medium Res Colour Monitor	£469
RS232 Kit for BBC Compact		£25
Additional 3½" Drive for BBC Compact (Securicor carriage £10)		£90

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7

ATTACHE CARRYING CASE

For the BBC Micro. Attractively finished in antique brown leatherette. Lockable.

Only **£10** (£2 carr.)

Continued 

CO-PRO Adaptor



With this Watford's Co-pro Adaptor unit, you can now attach any BBC Master's coprocessors to your original BBC B.
Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.
With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.
To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.
Master owners may use Co-Pro Adaptor to add a second Co-processor externally.
Watford, brings power to your BBC at only:

£35 (carr £5)

Watford Electronics are Appointed & Authorised

DEALERS / REPAIR CENTRE

for Acorn Computers Ltd
Cambridge Computers Ltd
Microvitec Monitors
Panasonic Printers

Versatile **BEEB SPEECH SYNTHESISER** Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

65C102 2nd PROCESSOR

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B. This is a complete package, with its own power supply, ready to interface with your BBC Micro.

£159

By Popular demand we are now supplying refurbished and fully guaranteed BBC Micro Model B with Disc Filing System
(Please telephone for price & availability)

The 80186 Co-Processor

This package consists of the Master 512 board, Watford Co-Pro Adaptor, 1770 Disc Upgrade and Acorn ADFS. This is a complete package, with its own power supply, ready to interface with your BBC Micro. The Master 512 board using the 80186 16 bit Processor at 10MHz and running Digital Research DOS Plus, gives a high degree of IBM compatibility at an extremely reasonable price. Included in the 512k package is a mouse and the amazing Digital Research GEM suite of software; GEM Paint, GEM draw and GEM desktop giving a complete Mouse Icons environment (All other GEM packages will work on the 512k). Famous packages that will work with the 512k board include Wordstar, Dbase II, Lotus 123 and many others. The only requirement to upgrade any BBC Model B to this system is you must have twin 80 track disc drives.

New low price **£219**

Archimedes Real-Time Digitiser



Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air television signals may also be digitised via a video recorder or TV tuner.

Once captured, Video images can be stretched, squahsed, rotated, stored on disk, printed, or used by applications software.

Applications include desktop publishing, graphics, animation, image analysis and recognition, medical imaging, automatic inspection and measurement, databases, interactive video, remote transmission of pictures via a modem, movement detection ... or anything else you can think of!

SPECIFICATION

SOFTWARE
All the driver software for the digitiser is contained in a ROM on the podule. Facilities provided include:
- Grabbing of images to the screen or dumping to memory.
- Continuous grabbing and display for previewing or camera alignment.
- 'Hot key' grabbing – pressing a (configurable) key combination grabs and displays an image on the screen while another program (e.g. paint software such as Artisan) is running.
- Scaling (zoom/shrink) any section of an image to any size in X and Y directions, with optional X/Y flip, window clip and logical (AND/OR/XOR) plotting.
- Rotation and scaling to any angle and size, rotating about any point, with optional window clip, and logical (AND/OR/XOR) plotting.
- Very versatile matrix printer screendump facility for Epson FX, LQ and EX compatible printers – pictures can be printed to ANY size (including multiple sheets) at any orientation, using any available printer density and one of six internal sets of dot patterns, or with user definable patterns (pattern editor supplied). The screen-dump can also be used for general purpose graphics screen printing.
- Pixel value lookup tables: pixel values can be passed through a user defined lookup table to allow contrast enhancement, thresholding pseudo-colouring etc.
- Smoothing and noise spot removal to enhance image quality.
- Creation of sprites from all or part of a digitised image.
- Saving and loading of digitised images in compressed format.
- Combination of pictures by adding, avaraging, subtracting, multiplication etc.
- Much faster versions of the Arthur *ScreenLoad and *ScreenSave commands.

Software facilities are accessed via operating system star (*) commands and SWI calls. High resolution screen modes using MultiSync type monitors are supported.

UTILITY DISK
A disk is included, containing sample pictures, examples and utility programs including the following:
- Colour image grabbing using colour filters with monochrome or colour cameras, including colour balance adjustment and scaling facilities.
- Pattern editor for 2 colour display modes and printer screendumps.
- 512 line interlaced display for non MultiSync monitors.
- Thresholding to create two colour images.
- Capture and replay of animated sequences.
- Several example programs illustrating the use of digitiser software.

RESOLUTION
Images are digitised to 512 (h) x 256 (v) pixels, and then scaled to fit the Archimedes' screen. It is possible to digitise to 512 x 512 pixels if the picture is stationary for about 0.1 second. 512 x 512 images can either be displayed on a MultiSync monitor, or on a normal monitor using interlacing.

Pictures are digitised to 64 levels of grey (6 bits). Note, however, that it is only possible to display all 64 levels on a monochrome monitor, or a colour monitor which has a composite (CVBS) input. For this reason, the Philips CM8533 monitor is recommended instead of the standard Archimedes monitor. It is also possible to connect both a colour and a monochrome monitor at the same time.

Any 2,16 or 256 colour graphics mode can be used to display digitised pictures. In two colour modes, grey levels are represented using dot patterns, which may be redefined if required (a pattern editor is supplied). **Cont.**

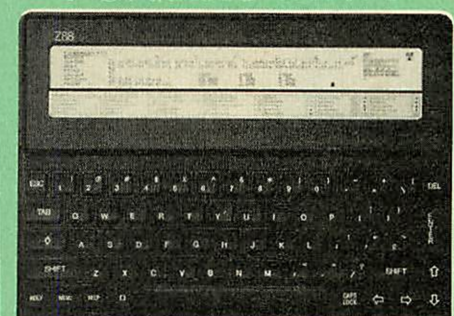
SPEED
Video fields are captured in real time (1/50th sec.), and then transferred to Archimedes' memory or the screen. The grab/display rate is dependant on the screen mode and picture size, up to 25 fields per second for quarter screen images, or 12.5 per second for fullscreen (Mode 9).

HARDWARE
The digitiser is a single width podule, with a BNC socket on the rear panel for the video input, which may optionally be terminated via a link. There is 128K of on-board memory to store the digitised image, and a 32K ROM on the podule contains all the driver software.

Automatic video level control and black level clamping circuitry is used to ensure that the optimum contrast is obtained from a variety of video sources. A filter is included to avoid patterning effects when using colour sources.

Price £249

Z88 Sinclair's Portable Micro



The worlds first, truly portable Micro. It is A4 size, only an inch thick and weighs under 2lbs. Ideal for use when travelling or as a personal organiser.

Only: **£239**

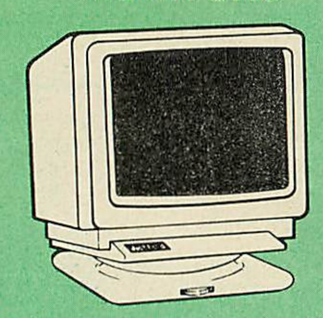
FREE
With every Z88 purchased from us this month, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

ACCESSORIES

Item	Price
Mains Adaptor	£8.65
32K RAM Pack or 32K EPROM Pack	£17.35
128K RAM Pack or 128K EPROM Pack	£43.40
512K RAM Pack	£169
Z88 Spellmaster for Pipedream	£51
Z88 to BBC Link	£21.70
Z88 to PC Link II	£30
Z88 to Macintosh Link	£49
Z88 EPROM ERASER	£34.75
Serial Printer Cable	£8.65
Parallel Printer Cable	£24.00
Z88 Modem	£145
Z88 Soft Carrying Case	£8.50
Sinclair Z88 Computing Book	£9.95
AA Nicad Rechargeable Battery	£1.50
Battery Charger, Compact & Fast (3 Hours)	£6

Continued


MONITORS & SWIVEL BASES



By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing on the left), you can easily adjust the monitor viewing angle.

for 12" Monitors **£8** (carr. £2.50)
for 14" Monitors **£12** (carr. £2.50)

All Monitors are supplied complete with BBC connecting leads FREE.

MICROVITEC 14"

- 1431 – Standard resolution as used on the BBC television computer programme **£175**
- 1451 – Medium resolution, suitable for word processing in mode 0 **£219**
- 1441 – High res, exceeds the capabilities of the BBC micro **£359**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£255**
- **2030 CS 20" Med Res** **£380**
- **2040 CS 20" Hi Res** **£675**
- Dust Cover for Microvitecs **£5.50**
- **Touchtec 501 Touch Screen** **£239**

TAXAN 12"

- TAXAN Super Vision 2 Type 620 Hi-res RGB Colour, Green/Colour Switch **£265**
- TAXAN Super Vision 3 – Type 625 Super Hi-res RGB Colour, Green/Colour Switch **£315**

14" MULTISCAN COLOUR

- **TAXAN** Multisync 770 Plus **£449**
- **EIZO** Flexscan 80605 – For technical info. read the review in Micro User, Jan. '89 **£459**
- **NEC** JC-1402P – Multisync II **£456**

NEW Aries 1458 14" Multisync

Aries 1458 is a state of the art, stylishly finished, flat screen, Enhanced Multiscan Colour Monitor. An auto-switching device changes modes without having to adjust the monitor (it also works in monochrome). Its wide frequency range (15-45KHz) and multi-colour display allows increased options and flexibility. 0.31mm dot pitch. Input Signal: TTL/Analogue, H-Sync 15-45KHz; V-Sync 47-100Hz; Bandwidth 35MHz; Resolution 800 x 600 Hi-resolution Multi colour Display; Display Colours CGA-16, Mono-Green (3 levels); EGA 64, Analogue – limited only by the video display adaptor; Built-in tilt and swivel base.

(FRO IBM PCs & Compatibles ONLY)

Launch offer **£349**

PHILLIPS

- BM7502 12" Hi-res Green Monitor **£65**
- CM8833 14" Med. Res Colour Monitor **£219**

STAR BUY

- **PHILLIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £199

Dust Cover for Phillips Monitors **£6**

SPARE LEADS

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

Anti-Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users.

£12

TAXAN KP-815 PRINTER

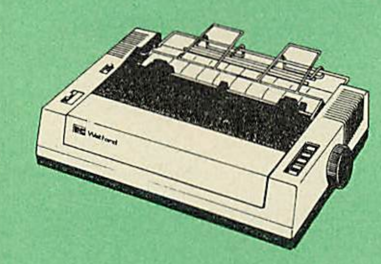
80 column, Bi-directional, 160 CPS, (NLQ 24cps); Friction & tractor feed + paper roll holder as standard; Epson FX compatible.

Offer Price £155

Taxan KP915 132 Column Printer
£275 (carr £7)

RS232 Interface	£49
RS232 Interface with 2K Buffer	£69
RS232 Interface with 16K Buffer	£89

Panasonic KX-P1081



Attractively finished in BBC beige. Bi-directional, logic seeking. Has IBM and Epson RX compatible command calls. Speed: 120CPS draft mode, 24 CPS NLQ mode. Character width range from 5 cpi to 17 cpi. Upto 40 downloadable characters. Functions include, Proportional spacing, Justification, centering and left & right ranging.

(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

WINTER SALE OFFER only: **£139**

Optional RS232 Interface: **£39**

PANASONIC PRINTERS

- KX-P1124 24pin 80col. 192/63 CPS **£349**
- KX-P1180 9pin 80col. 192/38 CPS **£169**
- KX-P1540 24pin 80col. 240/80 CPS **£449**
- KX-P1592 9pin 136col. 216/45 CPS **£295**
- KX-P1595 9pin 136col. 288/61 CPS **£409**
- Panasonic KX-P4450 LASER PRINTER Latest technology at Watford's special offer price **£1,540**
- Spare Toner **£29**
- A4 Feeder **£55**

PRINTER LEADS

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 1 meter	£6
IBM Parallel Lead 1 meter	£6
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.

RS-232 GENDER CHANGERS

Male to Female	£4.95
Male to Male	£4.95
Female to Female	£4.95

INTEGREX COLOUR JET PRINTER

- Colour Jet 132 Printer **£515**
- Paper Roll **£6**
- Screen Dump Software **£10**
- Colour Cartridge **£14**
- Black Cartridge **£8**
- 100 A4 OHP transparencies **£55**
- 8K Serial Interface Optional **£123**

NEW – Intergrex COLOURCEL NPQ Ink Jet Colour Printer **£2,695**

NEC P2200 PINWRITER

24 pin; 80 column; 168CPS – 56CPS LQ; Epson LQ compatible, 7K Buffer; 7 resident FONTS, Friction & Tractor feed, front load single sheet feed, etc.

Price: £269

Pinwriter Serial Interface (optional)	£55
P2200 Cut Sheet Feeder	£65
Additional Font Cartridge	£25
NEC P2200 Pinwriter Ribbon	£6

NEC PINWRITER P6/P7 Plus

The Ultimate 24pin matrix Printer for Business.

P6 Plus 80 columns	£439	P7 Plus 136 columns	£575
Colour Option	£74	Serial Interface	£73
Cut Sheet Feeder	£125		

Star LC10	**£175**	**LC10 Colour**	**£215**
Star LC24-10	**£279**	**NB24-10**	**£399**

Brother HR20 DaisyWheel Printer **£339**

EPSON PRINTERS

EX800	£405	LQ850	£430
EX1000	£564	LQ1050	£570
FX850	£315	LQ2550	£925
FX1000	£425	LQ2500+	£839
FX1050	£439	LX800	£175
LQ500	£275	SQ2500	£975
GQ3500 Laser	£1150		

PLOTTERS

Hitachi 672 Colour Plotter	£475
Plotmate Plotter A4S	£379
Plotmate Plotter A3M	£549

CUT SHEET FEEDERS for
EX800 **£149**; EX1000/LQ2550 **£210**; FX800 **£149**; FX1000 **£179**; LQ/LX800 **£139**; LQ500 **£75**; LQ850 **£135**; LQ1050 **£175.**

TRACTOR FEED for
EX800/1000 **£85**; LQ800 **£44**; LQ850 **£69**; LQ1050 **£85**; LQ2500 **£195**

ACCESSORIES

- EX800/1000 Colour Option **£55**
- EX800/1000 Colour Ribbon **£18**
- LQ2500 Colour Option **£65**

(Securicor Carriage on Printers £7

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£40	RS232 + 8K Buffer	£79

Universal Printer Sharers/Changers

Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spagetti Junction of wires). Internal connection is made via high quality ribbon cables.
(Ideal for School environments.)

Connects	Serial	Centronics
2 to 1	£20	£22
3 to 1	£27	£30
5 to 1	£36	£39

(Cables extra at £5 each. Please specify type required when ordering)

Listing Paper (Perforated)

- 1,000 Sheets 9½" × 11" Fanfold Paper £7
- 2,000 Sheets 9½" × 11" Fanfold Paper £12
- 1000 Sheets 9½" × 11" NCR 2 Part Fanfold £19
- 1,000 Sheets 15" × 11" Fanfold Paper £9
- 1000 Sheets true A4 Fanfold Paper £11
- 2000 Sheets true A4 Fanfold Paper £19
- Teleprinter Roll (Econo paper) £4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

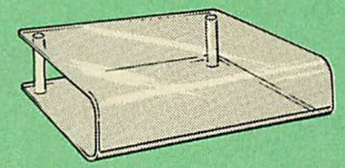
PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 × 36mm (Single Row)	£5.00
1,000 90 × 36mm (Twin Row)	£4.90
1,000 90 × 49mm (Twin Row)	£7.50
1,000 102 × 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand. The printer sits on top and the fanfold paper rests neatly underneath, thus occupying the same space as the printer footprint.

Only: £16 (carr. £3)

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

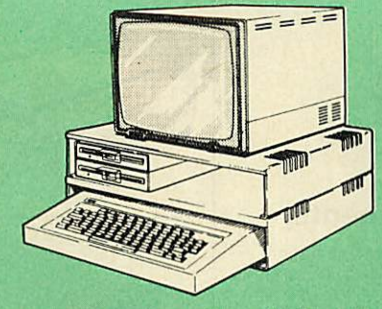
80 Column version £23 (carr. £3)
132 Column version £26 (carr. £3)

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
IBM PCs pair	–	£6.00
Brother HR15/20	£3.00	£5.00
DMP2000	£3.75	£4.75
EX/LQ800	£4.50	£4.50
EX/LQ1000	£7.50	£5.00
RX/FX80/85/800/MX80	£3.90	£4.95
RX/FX100/1000	£5.75	–
Kaga/Taxan KP810/815	£4.90	£4.00
LC10 (Black)	£4.25	£5.00
LQ500/800	£3.75	£5.00
LQ1050/LQ2500	£8.50	£5.50
LX80/86/800	£3.80	£4.50
M1009/GLP	£3.80	£3.75
Panasonic KX1080/81	£4.00	£4.75
SQ2500	£23.00	£5.50
Star NL10	£3.75	£4.50
Olivetti Ink Jet Cartridges (set of 4)	£9	

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	**£12** (carr. £2)
Double BBc Plinth	**£20** (carr. £3)
Printer Plinth	**£12** (carr. £2)
Single Master Plinth	**£13** (carr £2)
Double Master Plinth	**£24** (carr £3)

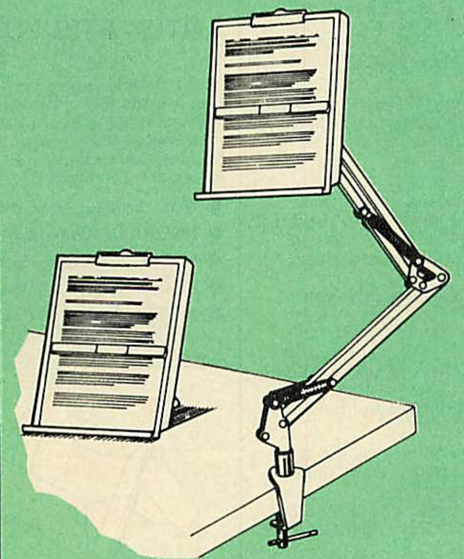
REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£15 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£10** (carr. £3)
Angle poise **£14** (carr. £3)

MEGABUFFER 256



The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

Only £149 (carr £5)

OKIMATE COLOUR PRINTER

The first ribbon transfer printer in its price range which offers fully versatile colour or black printing. A 24 element print head produces more than 100 shades with exceptional clarity. Ideal for use with Quest Paint or AMX Super Art.

Only: **£119**

BBC Screen Dump	£10
Colour Ribbon	£6
Black Ribbon	£6

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

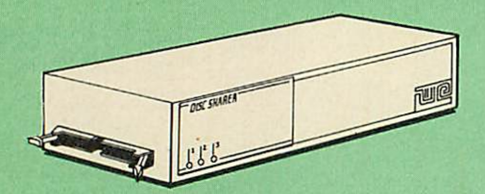


CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Continued



DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£65** Price includes 3 Cables

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

WATFORD's & ACORN's DFSs

Watford's popular and widely acclaimed DFS has now been available for six years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn standard DFS). (while Acorn's 1770 DFS is fully compatible with Watford's Mk II DDFS)***

- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**
  (P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).
- *Watford's sophisticated DFS ROM only* £16
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* £12
- *DNFS ROM only* **£17**
- *ADFS ROM only* **£25**

(The Single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

NEW

Watford's MkII 1770

Double Density DFS Interface

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features:

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00**.

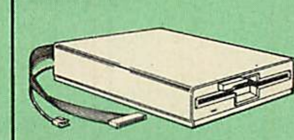
- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

Special 40/80 Disc Drive/DDFS Mk II Offer



- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both, Single & Double Density modes.
- A comprehensive User Friendly Manual.

A Bargain at Only **£123** (£7 carr)
(Offer valid while stocks last)

3½" DISC DRIVE OFFER

These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

- **CLS35 400K Unit** **£69**
- **CLD35 800K Unit** **£126**

Mysteries of Disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in black leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

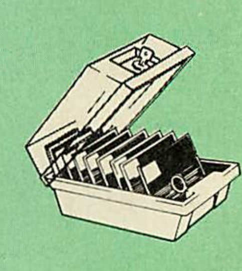
FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

£4

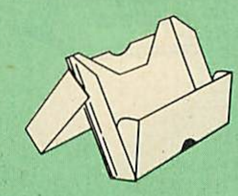
ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



- **M35** - holds upto 50 5¼" discs **£4.95**
- **M85** – holds upto 95 5¼" discs **£6.95**
- **M25*** – holds upto 25 3 ½" Discs **£4.95**
- **M50** – holds 50 3½" Discs **£6.50**
- **M10** – holds upto 10 Data Cartridges **£15**

* Not lockable



PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

DISC PLONKER RACK



When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5¼" Discs.

Protection at Only: **£2**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

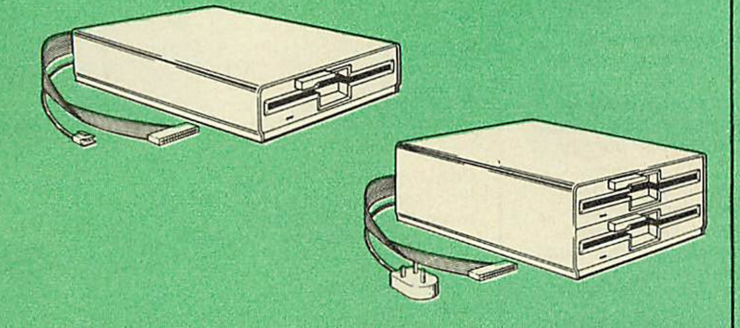
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £10. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 5th page of our advert for the Plinths).

P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415



"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £79	CLD 400 £168	CS 400S £89	CD400 £188
800K (1.44M)		CLD 800S £159		CD 800S £179

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £5 to £6

*Prefix **C** = Cased Drive*
L = Less PSU
S = Single
D = Double

*Suffix **S** = 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

- *10 × 5¼" S/S D/D 40 Track Diskettes (744)* ***£6.00***
- *10 × 5¼" D/S D/D 40 Track Diskettes (745)* ***£7.00***
- *10 × 5¼" S/S D/D 80 Track Diskettes (746)* ***£11.50***
- *10 × 5¼" D/S D/D 80 Track Diskettes (747)* ***£11.00***
- *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT* ***£16***
- *10 × 3½" S/S D/D 40/80 track Discs* ***£10.00***
- *10 × 3½" D/S D/D 40/80 track Discs* ***£11.75***
- *10 × 3½" High Density Diskettes* ***£25***

TOP QUALITY 3½" & 5¼" DISKETTES

To complement our range of Quality Discs and Disc Drives, WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

- *10 × **M3** 3½" D/S D/D 80 Track Discs* ***£11***
- *10 × **M9** 3½" Double Side High Density* ***£25***
- *10 × **M4** 5¼" S/S D/D 40 Track Discs* ***£5***
- *10 × **M5** 5¼" D/S D/D 40 Track Discs* ***£7***
- *10 × **M7** 5¼" D/S D/D 80 Track Discs* ***£9***
- *10 × **M8** 5¼" D/S H/D Hi-Density Discs* ***£14***
- *3" Double Sided Discs* ***£2.50** each*

PRICES SLASHED

Special BULK OFFER on 5¼" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£35	£39	£45
● With Sleeves	£38	£42	£48



WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

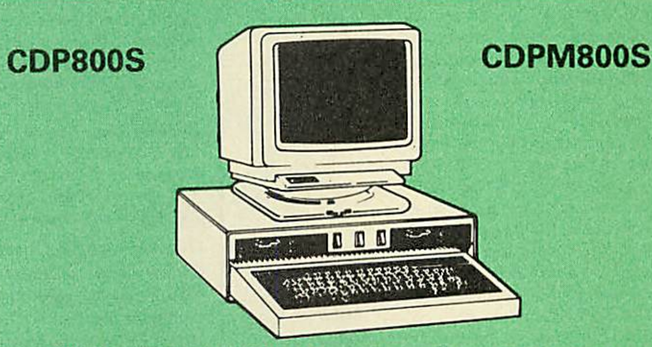
This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.

Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBc B (with 17 X disc interface).

● 10 Megabyte **£350**; ● 30 Megabyte **£405**
(Securicor Carriage £9)

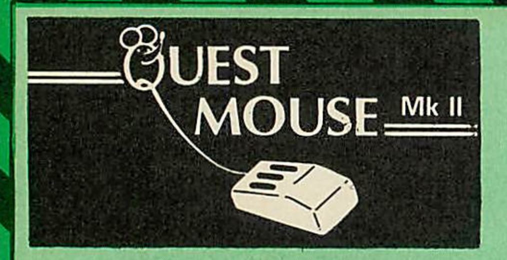
CDP800S CDPM800S



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £182
CDPM 800S for Master £185
DP35-800 for BBC/Master £169
(For DP35-800S spec. see Page 13 of our advert)
(Securicor Carr. £7)
(The above drive units are 2 Megabytes unformatted)

Continued 



QUEST MOUSE MkII

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and its RUBBER COATED STEEL BALL is smooth and easy to use on virtually any work surface. This also eliminates any directional bias that one encounters on the most well-known mouse for the BBC. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package
With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87
"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."

"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

FREE

With every QUEST MOUSE package purchased from us this month, we are giving away absolutely FREE our QUEST FONT DISC software pack.

A&B Computing June '87
"... Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package..."

"... you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."

"What we have here is probably the best art package there is for the BBC Micro ..."
"Quest Paint is a major leap forward in BBC programming..."
"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".

Acorn User, September '87
"The mouse (Quest) performs well in the face of competition from AMX, Wigmore and the rest ..."
"... this package represents excellent value for money. If you are interested in art then this program is for you to buy".
"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require".
"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function".
"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford".
"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus ..."
"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides".
"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program". The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package".

John Kilby, Head of Computer Science, Bishop Wulstan High School, Rugby, writes:
"Quest has been an excellent piece of equipment. The problem that seems to occur everyday is that at lunchtime the pupils rush to the computer room to make sure that they are first in the queue for the 'Quest' mouse".

Beeblet User Group, New Zealand Oct '87:
"One of its nicer features is that the top menu is done in Mode 0, the drawing itself is in Mode 1. Thus on screen together are two different Modes. A neat way around an old problem".

Item	Price
Quest Mouse II & Quest Paint	£58
Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont	£89
Quest Mouse II only	£26
Quest Paint Software only	£34
Quest Font Disc	£15
Quest Mouse Mat	£3
Part Exchange your unreliable AMX Mouse for a Quest Mouse for only	£22
GXR ROM for the BBC Micro	£22

(P.S. Quest Paint is not compatible with BBC Compact)

N.B.
1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

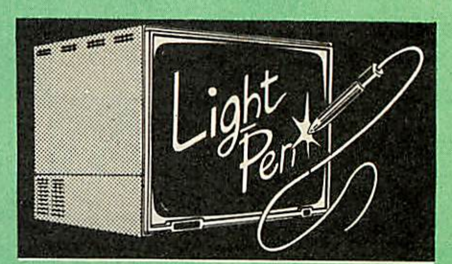
ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.
Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

ConQuest ROM Package **£30**
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

MARK II LIGHT PEN



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.

Price Only £21

(Price includes FREE software Disc and Operating Manual)

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Software Pack for Compact	£40
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

THE NEW Mk III AMX MOUSE

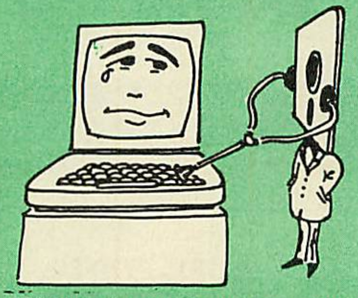
ONLY: £59 Inc. Super Art package (carr £3)

(Please specify for BBC, Master or Compact)

FREE our popular Colour Art software pack worth £15 with every AMX Mouse package purchased from us.

MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX UTILITY Package	£11
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£12
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£15

DIAGNOSTICS DISC



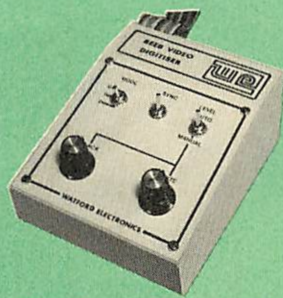
The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package i designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £5)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)

A combination of the Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Stop Press to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Stop Press's many features, a variety of pictures can be composed – the only limit being the imagination.

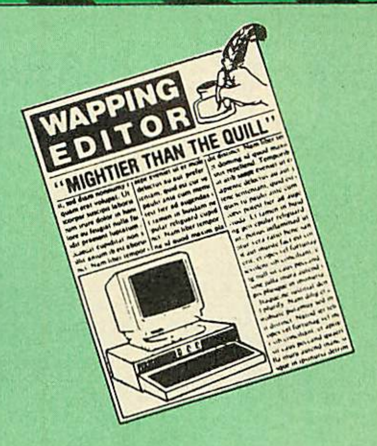
Pictures can be doctored using Stop Press's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)



Watford Electronics bring professional quality Desktop Publishing to the Beeb. The Wapping Editor is a totally self contained mouse-driven desktop publishing package designed to run on the BBC B, B+ and Master computers. The massive 64K Rom contains ALL the software you need to do your own publishing. It 'Brings the Freedom of Press' to your fingertip. The software has a word processor, a graphics package, a page layout section and a font designer. Although very sophisticated, Wapping Editor is simplicity itself to use. Anyone already familiar with Quest Paint will immediately feel at home.

GRAPHICS PACKAGE

Imagine Quest Paint re-written to take advantage of the high resolution of Mode 0, well this is it. The Wapping Editor could well be worth buying for this facility alone. This must surely be the graphics.

WORD PROCESSOR

This section is a fully functional word processor specially tailored to suit the Desktop Publishing environment. Gone are all the unnecessary and cumbersome text formatting commands – these are dealt with in the 'Page-Layout' section. The features of this word processor include wordwrap, wordcount, insert/overwrite, move block, copy block, delete block, search and replace, browse, etc, many of these features being mouse controlled. Text input can of course be taken from existing word processor files like Wordwise, View, etc, but it is not necessary to have a separate word processor in order to use this package.

PAGE-LAYOUT SECTION

Page Layout becomes easy using these mouse-driven routines. The user simply 'pulls' a rectangle onto the page and states which text document or graphic is required to fill the space – it's as simple as that! Text can be automatically printed in a pre-set number of columns, left justified and/or right justified, or centered. Several different typefaces can be held in memory at one time. Graphics may be stretched, squahsed or cropped to fit any size rectangle. Graphics input can be from the software provided in the package or, using the 'mode convert', from any graphics mode screen.

THE FONT EDITOR

This is an enhanced version of the font editor contained in the Con-Quest ROM and allows the editing of ALL 95 characters. As well as being able to design your own typefaces, fonts from other DTP packages or from Quest Pain may be loaded into the editor and converted for use with the Wapping Editor. This sophisticated editor has numerous functions including slide, flip, invert and rotate individual characters or the whole font. Individual characters can be mirrored or copied and a mask feature allows you to superimpose two characters. Lines and columns can be inserted or deleted allowing the character to be stretched or squashed. This font editor will also allow 'font' and 'brush' files to be designed for use with Quest Paint.
This package is the latest in the line of integrated professional quality mouse-driven software from Watford Electronics, the company that adds power to Beeb.

Wapping Editor	Launch Offer: **£69**
Wapping Editor with Quest Mouse	**£89**

Continued




ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£80** (carr. £2)

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price:	
Aries B-12	**£40**
Aries B-12C	**£5**



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

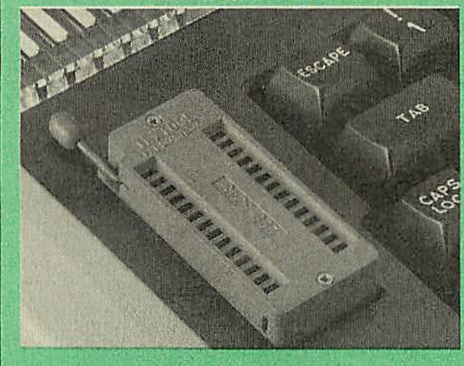
£238 (Carr £3)

EXTERNAL ROM BOARD for BBC MASTER

This external Beige finished, free standing cased unit with its own Power Supply allows you to plug-in upto 12 ROMs and 16K Sideways RAM.

Only £78

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

Complete System	**£11**
Spare Cartridges	**£2.50**
Spare Rack	**£1.50**

ROM Cartridges for the BBC Master
Twin **£8;** Quad **£12**

16K DISC RAM

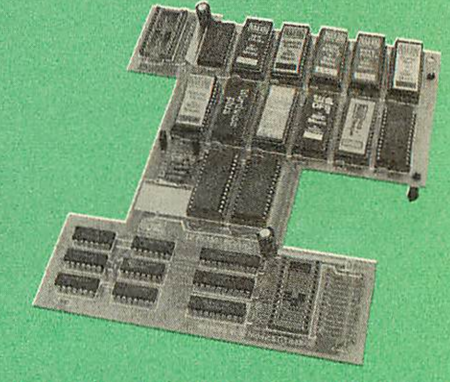
Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Compact construction.
- Supplied complete with Battery Backup.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£35** (carr £2)

P.S. 16K Disc Ram Board is not designed to work in conjunction with a Sideways ROM Board.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

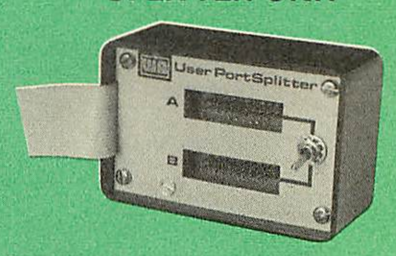
- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
Battery Backup only **£3**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

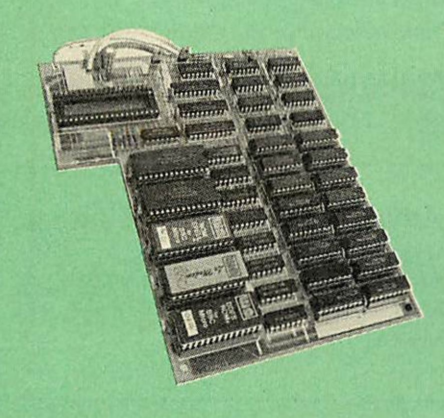
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£22** (carr £2)

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM ***£48***
- ROM/RAM card with 64k dynamic RAM ***£65***
- ROM/RAM card with a massive 128k dynamic RAM **£109**

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit **£17**
- 16k Dynamic RAM for Upgrade **£17.50**
- Battery backup **£3**
- Read and Write protect switches .... **£2 each**

Complete ROM-RAM board All options installed **£115**

P.S.
Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less

Le Modem



The MODEM from Watford

The features that make Le MODEM such good value are:

- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- ***FREE Registration to MicroLink.***

SALE OFFER £62 (carr £5)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

APOLLO



The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**
- **£6.50 off annual Membership to Micronet, Prestel and Telecom Gold.**

Sale Offer: **£64** **(Carr £5)**

Price includes, the Modem, Comm Software Cables & Operating Manual).
(Write in for full specification)

NEW

Aries 1200 MODEM



If you thought £150 didn't buy much of a modem you haven't heard about the aries 1200

Up till now buying a modem was a compromise between price and performance, but the new Aries 1200 offers performance and features not found on modems costing two or three times as much. Look at the features offered by the Aries 1200, features which you wouldn't expect from a modem at this price – and some which you would be lucky to find on a modem at any price.

- Operates in V21 (300/300), V23 (1200/75 and 75/1200) and proprietary V23 1200 mode.
- Connect it to any type of computer or terminal via the 25 way serial D connector or the BBC standard 5 pin Domino socket.
- A built in phone socket means your phone plugs straight through.
- A reset switch so the hardware makes it easy to restart – even when your software doesn't.
- Industry standard Hayes (C) compatibility means that this is one of the easiest modems to use. It can automatically work out the speed your computer is working at, and even the speed and protocol of the modem at the other end.
- Auto Call mode can dial using tone or pulse (the modem works that out too), and when it connects it will automatically determine the speed of the answering modem.
- Auto answer mode means the modem can be left unattended to answer calls from other modems, and of course it automatically works out the speed and protocol of the calling modem.
- The built in speaker and front panel LED's mean that you always know what the modem is doing.

. . . Features at any price.

- Proprietary V23 mode mean that two Aries 1200's can communicate at 1200/1200 and in this situation you can take advantage of the built in data compaction which reduces the volume of text you send by 30%.
- Built in scrambler means that data transferred between two Aries modems is automatically encrypted. The encryption code can be user defined for a totally private email system.
- User defined control commands means that the Aries can even be used from a dumb terminal or with non standard software.
- Front panel light include indicators for Power, Auto Answer Mode, Transmit, Receive, On line, Terminal ready and Carrier Detect. There's even an indicator to show the quality of the phone line.
- Internal watch-dog monitors the modems activity and in the event of a power failure or computer crash it automatically resets the modem. The Aries modem can never hold open your phone line or lock up your computer.
- Built in printer port allows the Aries to direct incoming data directly to a printer, text can be tagged so that it is selectively sent either to the printer or the computer.
- All modem setting are stored in solid state non volatile memory – no battery to go flat and hang crash the system.

Launch Offer **Only: £149**

Hayes Compatible BBC Comms Software ROM & Manual **£25**

WATFORD CUT PRICES NOT PERFORMANCE

Continued



COMPUTER CONCEPT'S ROMS

ACCELERATOR	£30
CARETAKER Basic Utility	£23
DISC DOCTOR	£28
Graphics ROM	£29
TERMI	£25
COMMUNICATOR	£49
Printmaster	£24

Wordwise £26

Wordwise plus £40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only £24

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £42

Inter SHEET ONLY £37



ONLY: £25

Inter-WORD £36

MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM £76

INTERBASE £49

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	£35
VIEW 3.0 ROM	**£48**
VIEW PROFESSIONAL	**£59**
HI-VIEW (for 6502 2nd Processor)	£36
VIEWSHEET (Acornsoft)	£36
VIEWSTORE	£36
VIEWSPELL with 80 track disc	£29
VIEWPLOT Disc (Please specify for Master 128 or Compact)	£20
VIEW-INDEX	£12
OVERVIEW Packs 1 & 2	£69

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs £11.25
- Maths with a Story 2 (Disc) 4 further maths programs £11.25
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs £17
- WAVES: Science Topics (Disc) CSC O Level Physics program. £14.95
- RELATIONSHIP: Science (Disc) O Level Biology program. £20.00
- BONDING: Science (Disc) O Level Chemistry program. £20.00
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. £20.00
- ELECTRONICS IN ACTION (Disc) O Level program £19.95
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. £20
- ECOLOGY (Disc) O Level program. £20
- POLYMERS (Disc) O Level program. £20
- Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. £20
- FOOD & POPULATION (Disc) O Level program. £20
- MICROTECHNOLOGY (Cassette) O Level program. £11.25
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. £21.70
- DEUTSCH DIREKT! (Disc & Audio Cassette) £19.95
- Modem Master (Disc) £11.25
- ADVANCED TELETEXT SYSTEM £8.65
- PERIOD TABLE SOFTWARE £20
- Astronomy – Primary (Disc) £12
- Computers at Work – Primary £17.35
- Introducing Geography – Primary £17
- **Introducing Geography 11-17yrs** £17.50
- Electric Fields 6-14 years £11.25
- BlackQueen Contract Bridge £13
- Espana Viva – 3 Discs £19.95
- A Vous La France Disc £21.50

MINI OFFICE II

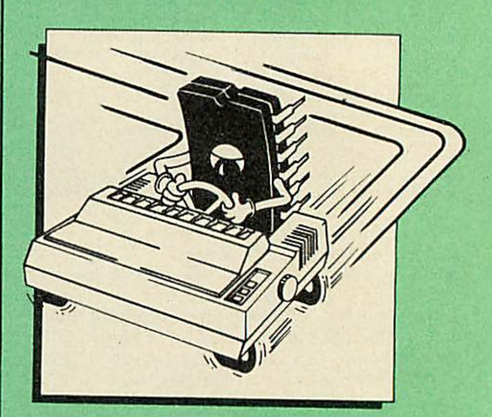
DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.50
Disc Version for the Compact	£18.00

(When ordering please specify for which Micro & 40 or 80 track Disc).

Advanced Computer Products

Advanced Disc Toolkit	£30
Advanced Disc Investigator	£25
Advanced 1770 DFS BBC	£29
Advanced 1770 DFS Master	£30

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

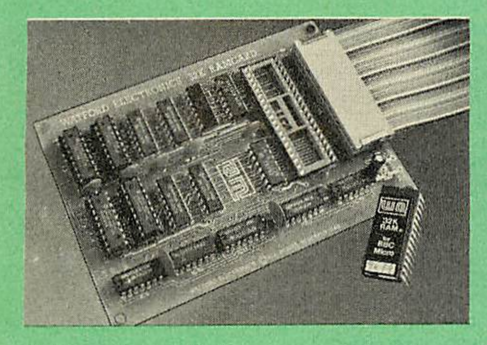
Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.
- Recommended by Computer Concepts for use with their Inter series of ROMs.

Only £59 (carr £2)

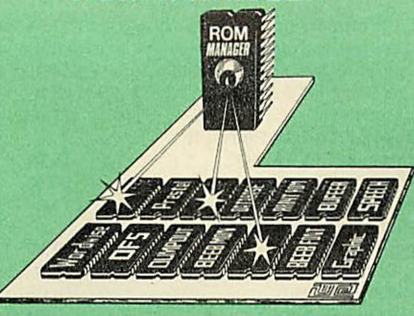
(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

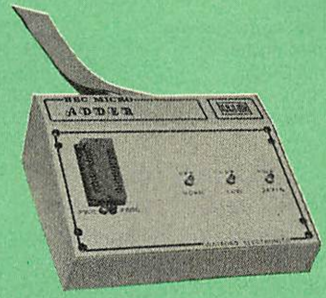
ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

£72 (£5 Carr)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

OFFICE MASTER



CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.
SPREADSHEET – Offers many calculation and editing features.
BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

Disc Drives DP35-800S



A Double disc drive – with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. For ease of access, the switches are front mounted. DP35-800S has its own power supply, independent of the BBC Micro.

Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format – currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

Launch Offer: **£165** (carr. £7)

Continued


BOOKS (No VAT on Books)

Title	Price
15 Hr Wordprocessing BBC/View	£5.95
15 Hr Wordprocessing BBC/WW & WW+	£5.95
30 Hour BASIC (BBC Micro)	£12.95
6502 Assembly Language Programming	£19.95
6502 Application	£13.95
6502 Development Package	£7.50
6502 Programming the	£16.95
6502 Reference Guide	£10.95
68000 Assembly Language	£15.95
68000 Assembly Language Prog.	£10.95
68000 Assembly Language Techniques	£24.95
68000 Machine Code Programming	£13.00
68000 Microprocessor Handbook	£14.95
68000 Programming the	£22.95
68000 User Guide	£8.95
6809, Programming the	£18.95
Advanced Disc User Guide	£18.95
Advanced Prog. Guide to BBC	£9.95
Adv. Sideways RAM User Guide	£9.95
Advanced User Guide for BBC	£10.95
Amiga Hardware Ref Manual	£23.70
Amiga Machine Lang. Guide	£19.95
ARM Assembly Lang. Prog. Manua £12	
Art of Microcomputer Graphics	£16.95
Assembly Language Prog. for the BBC	£9.95
AY-3-8910 Programmable Sound Generator Data Manual	£3
BASIC 2 – User Guide	£2
BBC – Advanced Graphics with the	£11.75
BBC – Advanced Programming Techniques for	£8.95
BBC – Mastering Assembly Code	£8.95
BBC Micro & the small Business	£5.75
BBC Micro Basic Sound & Graphics	£7.95
BBC Micro – File Handling On	£8.50
BBC Micro Programs in BASIC	£5.95
BBC Micro ROM Book	£10.95
BBC Micro – within the	£13.95
BBC Master 128 for High Flyer	£10.95
BCPL User Guide	£14
BCPL The Language & its Compiler	£8.50
C Big Red Book of	£7.50
C - A Dabhand Guide to	£14.95
'C' Introducing	£9.95
C for Programmers	£9.95
C Programming Lang.	£23.95
COMAL – Introduction to	£9.50
Complete FORTH	£6.95
Computer Graphics & CAD fundamentals	£9.95
Deutsch Direkti (Book only)	£5.95
DNFS Instruction Booklet	£2
Disc Drive Projects for Micros	£6.50
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
File Handling on BBC Micro	£8.50
FORTH – Advanced	£9.95
FORTH – A Text Reference	£19.10
FORTH – Introduction to	£8.95
FORTH on the BBC Micro	£9.95
FORTH – Starting	£20.85
Hackers Handbook - New	£6.95
Hitch-Hikers Guide to A.I.	£8.95
Interfacing and Robotics	£15.95
Introduction to COMAL	£9.50
Introduction to FORTH	£8.95
Introduction to LOGO	£6.95
Introduction to PASCAL	£17.95
Inside Information, Computers & Coms.	£9.95
ISO-PASCAL Reference Manual	£9.95
LISP 2nd Edition	£15.95
LISP Looking At	£11.95
LISP the Language of Artificial Intelligence	£13.95
Logo on the BBC Micro	£7.50
LOGO – Introduction to	£6.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering Assembly Code	£8.95
Mastering CP-M	£17.95
Mastering Interpreters & Compilers	£14.95
Mastering Music	£6.95
Mastering the Disc Drive	£7.95
Master Operating System	£12.95
Master Reference Manual Part 1	£14.00
Master Reference Manual Part 2	£14.00
Master Reference Manual – Advanced	£19
Mathematical Prog. in BBC Basic	£7.95
Micro Prolog	£10.00
Microtext for the BBC	£10.00
Microtext Plus Manual	£9.95
Microtext User Guide	£5
PASCAL – Introduction to	£17.95
PASCAL Programming	£9.45
Pick Operating Sys. Practical Guide	£14.95
Practical Disc File Techniques	£5.95
Structured Basic	£7.95
The Epson FX-KAGA PRINTER Commands REVEALED	**£5.95**
The Software Business	£5.50
Towers Int. Transistor Selectors	£14.95
Understanding Interword – A Beginners Guide	£6.50
Using DOS+ on the 1512 (95% Ok for 512 Bd)	£9.95
View 3.0 User Guide	£10
View Guide (View 2.1)	£4.50
Viewsheet & Viewstore Dabhand Guide	£12.95
Mastering View, Viewsheet & Viewstore	£12.95
VIEW Dabhand Guide	£12.95
Viewsheet User Guide	£10
Viewstore User Guide	£10
Wordprocessing On The BBC Micro	£6.25
Writing Interactive Interpreters & Compilers	£8.45
Wordwise + A User Guide	£9.95
Z80 Applications	£15.95
Z80 Assembly Language Prog.	£20.95
Z80 Programming the	£19.95
Z80 Reference Guide	£9.95
Z88 Computing	£9.95
Z88 Using Your	£9.95

BOOKS for IBM PC & Compatibles

Carriage on Books vary between £1 to £3.50, depending on their weight.

Title	Price
1-2-3 For Business 2nd Edition	£20.95
1-2-3 Command Language	£19.95
1-2-3 Special Edition (QUE) – Using	£21.95
8086/8088 Assembly Language Prog.	£11.95
8086/8088 Programming the	£17.95
Ability – Using	£12.95
Accountancy software in Business – Using	£12.95
Advance C Tech & Application	£19.95
Advanced Tech. in Turbo Pascal	£19.95
Aldus Pagemaker – Using	£18.45
Amstrad Basic 2 Manuals	£12.95
Amstrad Technical Manuals (Please specify 1512 or 1640 when ordering)	£19.95
Amstrad PC Programmers Ref Guide	£8.50
Amstrad PC1512-1640 Step by Step – Using	£8.50
Art and Desktop Publishing	£18.45
Autocad – Using Release 10	£26.95
BBC Assembly Ref. Manual – within	£11.95
Business companion on the 1640	£12.95
CP-M Bible	£16.50
CP-M Handbook with MPM	£9.95
CP-M Plus Handbook	£13.95
CP-M Soul of	£16.50
CP-M The software BUS	£8.95
dBase II & III – Understanding	£7.95
dBase II – Working with	£9.95
dBase III – Mastering	£21.95
dBase III Plus	£12.95
dBase III Plus – Mastering	£21.95
dBase III Plus Handbook 2nd Edition	£20.95
dBase III Plus – tips, tricks and traps (QUE)	£19.95
dBase III Plus – Quick Ref. Guide	£4.95
dBase III Plus – Quick Prog. Guide	£8.95
DOS Instant Reference (up to 3.3)	£10.95
DOS, Mastering for Versions up to 3.3	£19.95
DOS Plus Manual/Amstrad PC	£10.95
DOS Plus – Mastering	£12.50
Excel IBM Version – Using the	£17.95
Hard Disk Manage IBM PC XT AT	£17.35
Hard Disc – Managing your	£18.45
IBM Mac Connection	£17.35
IBM PC & Macintosh Networking	£17.95
IBM PS/2 Handbook	£17.95
IBM PC AT – Inside the	£20.95
Local Area Networks 2nd Generation	£19.95
Lotus 1-2-3 Desktop Companion Soft/B	£24.95
Lotus 1-2-3 – Illustrated	£18.45
Laserprint it	£15.95
Managing your Hard Disk	£18.45
Mastering 1-2-3 2nd Edition	£18.95
Microcomputer CAD Manual	£25.95
MS-DOS – ABC on	17.95
MS-DOS Advanced Programming	£19.95
MS-DOS Advances (Microsoft)	£19.95
MS-DOS Handbook 3rd Edition	£18.95
MS-DOS Instant Reference Guide	£10.95
MS-DOS Illustrated	£18.45
MS/PC DOS 3.3 – Illustrated	£18.95
MS-DOS Mastering – Tricks of	£22.50
MS-DOS Performance Programming Under	£19.95
MS-DOS Quick Prog Ref Guide	£8.95
MS-DOS Quick Reference Guide	£3.95
MS-DOS – Running 3rd edition	£21.95
MS-DOS – Supercharging	£17.95
MS-DOS Users Guide 2nd Edition	£20.95
Operating the IBM PC Network	£18.45
Pagemaker – Desktop Publishing	£15.95
Pagemaker IBM PC – Mastering	£18.45
Pagemaker – Illustrated	£18.45
PC 1640 Technical Ref. Manual	£19.95
Quattro – Mastering	£21.95
Smart – Using	£21.45
Smart – tips, tricks and traps (QUE)	£22.45
SuperCalc 4	£19.95
SuperCalc 4 – Using	£17.45
Symphony 4th Edition – Mastering	£24.95
Turbo Pascal Complete 2nd Ed.	£21.45
Turbo Pascal Library	£14.95
Using 1-2-3 2nd Edition	£21.95
Using DOS+ on the 1512 (95% OK for 512 Ed)	£9.95
Using Microsoft WORD 2nd Edition	£18.45
Using PC-DOS 2nd Edition Ver. 3.3	£20.45
Using Pagemaker on the IBM PC	£22.45
Using SuperCalc 4	£17.45
Ventura – Mastering	£21.95
Ventura Publishing – Instant incl. DISC	£34.75
Ventura Tips + Tricks	£18.95
Wordperfect Desktop Companion	£2.95
Wordperfect – Illustrated	£18.45
Wordperfect 3rd Ed – Using	£18.45
Wordperfect Made Easy	£15.95
Wordstar & CP/M made easy	£10.95
WordStar Release 5.0 – Mastering	£19.95
WordStar 1512/1640 – Using	£9.95
WordStar User's Ref. manual	£12.50
Wordstar – Quick program Ref. Guide	£8.95
WordStar 4.0 – Using 2nd Edition	£18.45
Xerox Ventura – Desktop Publishing	£14.50
Xerox Ventura Publishing – Inside	£18.45

NEW

The Advanced Reference Manual for the BBC Master

At last Acorn's long awaited Advance Reference Manual for the BBC Master Series of Microcomputers has now been published. Watford Electronics' own authors have edited and added missing sections to the original script and produced a very high quality publication.

It features information about:

- Memory Organisation
- Slow data bus
- Detailed circuit description
- Keyboard controller
- Screen display
- User port
- Serial Processor
- Peripheral bus controller
- 1 Mhz Bus
- Machine operating System
- Second processors – Internal, Z80 and 80186
- Disc Filing Systems
- ANFS
- Terminal Emulator & Editor
- View internal format
- Detailed differences between Model B, B+, Master 128K and Compact
- Comprehensive appendix on 65C12 instruction set

At the rear of the manual there are pull out circuit diagrams for the Master 128K. A worth-while addition to any Master owner's library.

All this for just £17 (NO VAT)

THE COMPLETE BBC COMPUTER USER HANDBOOK

"Why has no-one written a book like this before? It's long overdue".
If you own a BBC-B, BBC B+, Electron, Master 128, Master Compact or Archimedes then this book is for you. It shows you how to get the most from your computer, and how to make the computer work for you. Although some sections are machine specific, most of the information, programs, hints and good solid experience are for the whole range of BBC machines. The general style and level means that both beginner and expert will feel satisfied with the quality and quantity of the material.

GENERAL – Uses and abuses of computers.

HARDWARE – How to design your own work station. Hardware additions (disc drives, ROMs, printers, 2nd processors, etc). DIY alterations.

HARDWARE RUNNING BBC-BASIC – All BBC machines are described with their differences. Compatibility between the various BBC machines. Networks. The Archimedes and its advantages.

GETTING ORGANISED – so that you keep track of your programs and control of your software. Setting up for easier programming sessions.

NEAT PROGRAMMING – Good style. Writing structured programs. Getting the best from BBC-BASIC, Graphics and screen displays. Speeding up programs. Saving space.

GENERAL PROGRAMMING TIPS AND HINTS – with a multitude of examples (eg input vetting, dealing with dates, blanking out function key messages, error trapping, disabling ESCAPE and BREAK, use of EOR with colour, etc).

DEBUGGING – Specific errors and how to handle them. How to test programs fully.

STANDARD PROGRAMS – Assessing word-processors, spread-sheets, databases, graphics packages, communications etc. How to customise them to your own requirements.

COMPUTERS AT HOME AND IN THE OFFICE – Introducing the computer to the office. Program protection. Computers and the law. Communications. Selling your own programs. 28 FULL CHAPTERS, elegantly written and extensively indexed. To dip into, consult, or read from cover to cover, again... and again... and again...

Only: **£14.95** (Book No VAT)

SPARES for BBC Micro

BBC Keyboard	£36	Speaker	£2
Master Keyboard	£62	Keyswitch	£1.50
UHF Modulator	£4	16MHz Crystal	£4
Speaker Grill	£1	32.768MHz Xtal	£1.00
Power Supply	£56	Master PSU	£59
BBC Casing	£20		

Servisol Foam Cleaner

This 415Ml, king size multi-purpose foam cleaner spray is ideal for cleaning the Keyboard, Monitor, Disc Drive and your computer furniture surfaces. Simply spray on the surface to clean and wipe off with a clean cloth.

£2.50

Antistatic Aerosol Spray

Ideal for cleaning and preventing static build-up on TV/Monitor Screens.

£2.50

Aerosol Dust Spray

Aerosol Dust Spray
This simple to use aerosol spray is ideal for removing Dust and Dirt deposits from the Keyboards and similar inaccessible places. **£3**



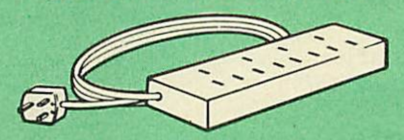
CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources which put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£7.50**

4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals.

£7.95 (carr £1.50)

SPIKES CLEANER UNIT

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete computer system

£13.00 (carr. £1.50)

ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip. **£2**

Replacement FLEXIBLE 17 way Keyboard Connector £3

28pin DIL HEADER PLUG

SOLDER type **£1.50**; IDC CRIMP type **£1.95**

8 WAY DIP SWITCH

Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ Keyboard.

Only **£1.00**

28 pin ZIF SOCKET (Textool) £6.95

Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below).

£14

Watford POWER DUCK £8

CONNECTING LEADS

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
to 5 pin DIN Plug + 1 Jack Plug	£2.00
to 3 pin DIN Plug + 1 Jack Plug	£2.00
to 7 pin DIN Plug	£2.50
to 3 Jack Plugs	£2.00
6 pin DIN to 6 pin DIN Plug (RGB)	£2.50

DISC DRIVE POWER LEADS
Supply from BBC power supply to standard Disc Drive connector.
Single **£3.00** Dual **£3.75**

DISC DRIVE INTERFACE LEADS
BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

Miscellaneous Connectors

	Plugs	Sockets
RGB (6 PIN DIN)	30p	45p
RS423 (5 pin Domino)	40p	50p
Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	20p	30p
Paddles (15 pin 'D')	80p	200p
Disc Drive Plug 4 way	75p	–
6 way Power Connector	80p	95p

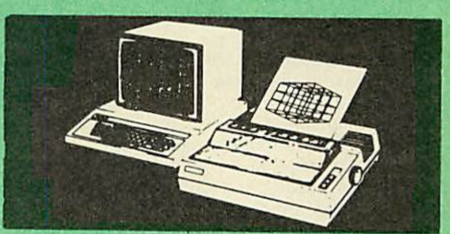
CHIP SHOP

DS3691	£4.50
DS88LS120	£5.25
LM324	£0.45
SN76489	£5.50
SAA5050	£8.75
UPD7002	£6.00
WD1770	£12.00
2764-250nS	£2.80
27128-250nS (12V5)	£3.25
27128-250nS (21V)	£5.25
27256-15	£5.00
27512	£9.00
27C101G (1 Meg)	£17.50
4013	60p
4020	£0.90
4164-15	£3.25
4464-12	£8.95
4464-15	£8.25
4816 RAM	£2.00
41256-15	£8.25
41256-12	£9.75
6264LP-8K	£6.00
6502A CPU	£4.50
65C02 3M	£9.75
65C12	£9.00
6512A	£10.00
6522	£3.40
6522A	£4.50
62256ALS-15	£12.50
6818	£4.00
6845SP	£6.00
68B50	£2.95
68B54	£7.50
7438	40p
74LS00	25p
74LS04	25p
74LS10	25p
74LS123	80p
74LS163	70p
74LS244	80p
74LS245	£1.00
74ALS245	£2.75
74LS373	£1.00
74LS393	£1.00
75453	70p
75159	£2.00
8271	£39
9637	£2.00
ICL7673PA	£2.00

ASSORTED ROMS

ACORN ADFS	£25
ACORN BASIC 2 plus User Guide	£22
Acorn BCPL	£42
Acorn COMAL	£38
ACORN DNFS	£17
Acorn FORTH	£32
Acorn Graphics	£25
Acornsoft C	£52
Acorn LISP	£19
Acorn LOGO	£49
Acorn OS B+	£25
Acorn OS 1.2	£14
Basic Editor	£24
BBC PCB Designer	£49
Beebfont	£25
Beebmon	£22
BROM Plus	£32
Buffer & Backup	£20
Communicator	£49
Commstar II	£28
EPSON NLQ ROM	£25
Graphics Extension Rom	
GXR-B	£21
GXR-B+	£22
Help II	£27
ISO Pascal	£51
ISO-Pascal Stand Alone Generator	£30
ICON Master	£28
Logotron LOGO	£45
Master OS ROM	£38
Master Termulator	£32
Micro Prolog	£62
Microtext Disc	£46
Microtext Rom	£199
Mini Office II ROM	£43
MUROM	£21
NLQ DESIGNER	£25
ROMIT	£29
Serial ULA	£13
TED	£35
Termulator B, B+	£25
Termulator Master	£32
Toolkit Plus B, B+	£31
Video ULA	£14

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:
- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered and User Port triggered dumps

The Micro User Feb. 1985.
'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".

For use with the following printers:
GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles.

Only: £25

Continued 

Watford Electronics introduce the first Amstrad PC® *incompatible ...*

The **Aries IBM PC® XT** compatible looks like a 'real' PC, runs software like a 'real' PC (but 3 times faster), expands like a 'real' PC, but please compare our sturdy steel case construction (with room for up to 4 drives) and price with an equivalent Amstrad system, to see why it's not quite fully *'Amstrad compatible'!*

Because the Aries 8MHz PC-88 system starts at just £489* . . . and a 40MByte system with EGA monitor costs only £999!

. . . and also takes the fun out of choosing a PC-AT® compatible

For around the price of an Amstrad PC1640, with an 8MHz 8086 microprocessor, you can now buy a 12MHz 80286 PC-AT® compatible.

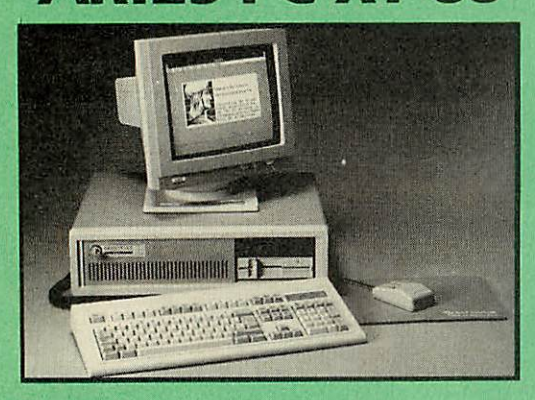
The new Aries 12MHz PC-AT® compatible starts at just £799*. . . and a 40Mbyte system with EGA monitor costs only £1399 !

So we're very sorry if we've taken the fun out of buying a PC for those who like to gamble with unknown names, or uncertain expandability, because with ***Watford Electronics'*** *trusted reputation, you know* you must be making the right choice.

**** Full specs and pricing are described below.***

All registered trademarks are acknowledged, and all information is believed to be correct at the time of going to press.

ARIES PC-XT 88



Specification:

- 16 Bit Intel 8088-2 or NEC V20 78108 microprocessor, running at 8MHz or 4.77MHz. (3 times faster than IBM PC/XT).
- 8087-2 maths co-processor, optional.
- 640K minimum expandable to 1024K on system board, extra 384K RAMDISK available.
- 360K Single Floppy (optional 2nd Floppy/3.5"/20MB Winny/T. Streamer).
- CLOCK on System board, gives non stop DATE & TIME.
- 8 expansion slots.
- 102 keys keyboard.
- RS232 with two ports.
- 150W power supply.
- Microsoft MS DOS 3.30.
- GW-BASIC 3.21.
- Mono graphics/parallel card.
- Legal BIOS and built in games port and clock.
- High resolution (1000 x 350 lines) State of the art, 14 inch Flat Screen Monitor.

ARIES PC AT286



Specification:

- 80286 microprocessor.
- Optional 80287 Maths co-processor
- 640K RAM standard expandable on-board to 4MB.
- 1.2M Single Floppy (optional 2nd Floppy/3.5"/Winny/T. Streamer)
- CLOCK on System board, gives non stop DATE & TIME.
- 8 expansion slots.
- 102 key keyboard.
- Serial/Parallel Card.
- HDD/FDD Card.
- Switchable Speed 8/12M Landmark test at 16MHz.
- 200W power supply.
- Microsoft MS DOS 3.30.
- GW-BASIC 3.21.
- Mono graphics/parallel card (Herc. Compt.)
- Slide in metal case with function display.
- Legal BIOS and built in games port and clock.
- High resolution (1000 x 350 lines) State of the art, 14 inch Flat Screen Monitor.

●FREE 12 month On-site Maintenance warranty (UK mainland) included in the price

Available in the following configurations:

- ***System 1 – Aries PC-XT 88 including 14" hi-res monochrome Flat Screen monitor*** ***£489***
- ***System 2 – Aries PC-XT 88 System 1 as above plus a 720K 3.5" Disc Drive fitted*** ***£579***
- ***System 3 – Aries PC-XT 88 System 1 plus a 20MB Hard Disk fitted*** ***£799***
- ***System 4 – Aries PC-XT 88 System 1 plus a 40MB Hard Disk fitted*** ***£849***
- **System 5 – Aries PC-XT 88/EGA hi-res Colour System, specifications as in 4, including Aries EGA Monitor/EGA Card and 40MB Hard Drive fitted.**

At a breakthrough price: £999

Available in the following configurations:

- ***System 1 – Aries PC-XT 286 including 14" hi-res monochrome Flat Screen monitor*** ***£799***
- ***System 2 – Aries PC-AT 286 System 1 as above plus a 720K 3.5" Disc Drive fitted*** ***£889***
- ***System 3 – Aries PC-AT 286 System 1 plus a 20MB Hard Disk fitted*** ***£1099***
- ***System 4 – Aries PC-AT 286 System 1 plus a 40MB Hard Disk fitted*** ***£1199***
- **System 5 – Aries PC-AT 288 / EGA hi-res Colour System, Specification as in 4 including, Aries EGA Monitor/EGA Card & 40MB Hard Drive fitted.**

At a breakthrough price: £1399

To start you up we include FREE £60 worth of PC Organiser software, consisting of: Wordprocessor, Database, Auto-Dialler, Desk Diary, etc.

Prices subject to change without notice and available on request. ALL OFFERS subject to availibility.
Mail Order and RETAIL SHOP. Trade and Export inquiries welcome. Government and Educational Establishments' OFFICIAL ORDERS Accepted.
Shop Hours: 9.00am to 6.00pm. Monday to Saturday. Thursdays 9am to 8pm. (Free Customer's Car Park)

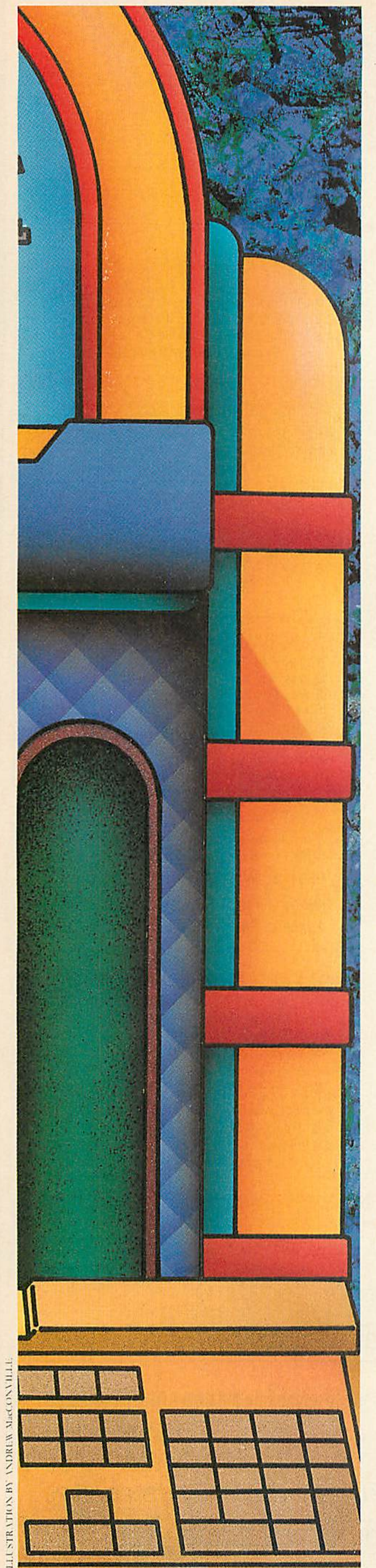
VAT: UK customers please add 15% VAT to cost incl. Carriage.
CARRIAGE: Unless stated otherwise, minimum £1 on all orders. £3 on Larger items. On bulkier items, £7 Securicor charge applies (UK mainland only). Overseas orders, carriage is charged at cost.



Specifications of all products are given in good faith but is subject to change without notice. Some items vary in their availability. Please ring for latest delivery situation.

Watford Electronics

JESSA HOUSE, 250 Lower High Street, WATFORD WD1 2AN, ENGLAND
Telephone: (0923) 37774; Telex: 8956095; FAX: 01 950 8989


ILLUSTRATION BY ANDREW MacCONVILLE

HIT AND RAM

Sideways RAM is like a jukebox – we make it easier to write your own sideways RAM programs with an example for Wordwise Plus

David Harper

Many BBC micros are now fitted with one or more banks of sideways RAM. And it's standard on the Master 128 and Compact. But most people don't use it very much for their own programs: ROM images are the usual fare. There is a feeling around that sideways memory programming is difficult. There are, it is true, a few extra things that you have to include in programs for sideways memory and this makes them rather longer than other machine code programs. However the extra code that you need is practically the same every time, and you can keep a standard piece of coding that you just tack on to each program.

One of the best uses for sideways RAM is to store machine-code utilities. It is a good place for them, because they are not in the way of your ordinary programs, yet they can be called at any time with a simple star command. The BBC micro's sideways RAM has been well designed, and it is quite easy to make use of it.

The first part of listing 1 in the yellow pages is a block of program that makes it simple to set up a sideways ROM. You just need to adjust the data statements, and then you can include it in almost any sideways memory program. Anyone who has had experience in writing small machine code programs in normal RAM will find it just as easy to write programs for sideways RAM, and sometimes it is actually easier. The whole listing shows how it can be done. It incorporates the block into a utility for converting programs between Basic and *Wordwise Plus* for easy editing.

There are two things that you must do if you're programming for sideways RAM. The first is that you get into the habit of saving your programs before trying them out. This is a good idea anyway, but is vital for programs in sideways RAM. A bug in a program in sideways memory can easily crash the computer completely, so that not even pressing CTRL/Break will restart it. You might have to turn everything off and back on again.

The other thing is this: get hold of the Basic 2 chip if you still have the Basic 1. The way to find out is to type *Basic followed by REPORT. Basic 1 has a 1981 copyright date.

Listing 1 is written for Basic 2, and would be quite awkward to convert to work with the earlier version. The important feature for assembly language programmers is the OPT 4 to 7 facility, which allows you to assemble machine code in a different part of memory from where it is finally going to run. You can't usually assemble code directly into sideways memory, but Basic 2 allows you to treat it as though you could.

The 6502 microprocessor at the heart of the BBC computer can only make use of 64k of memory. Sideways memory, sometimes called paged or bank-switched memory, is a way of getting around this limit. The idea is that there are several separate 'banks' of memory which all have the same memory address as far as the microprocessor is concerned. At any one time only one of the banks is accessible. In order for it to get at the information in one of the other banks, the old bank has to be switched off and replaced by the new one. Like a jukebox, you can have lots of records, but only play one at a time. The BBC micro is

designed to take 'records', or up to 16 banks of sideways RAM, even though the model B only has four actual sockets to plug them in. Each occupies memory between address &8000 & BFFF. Because they are electronic, the 'records' can be changed very quickly.

The memory banks are numbered from 0 to &F. From the hardware point of view, a bank is switched on by storing its number in location &FE30. So, for example, memory bank &D is made the current bank by the instructions:

```
LDA #&D:STA &FE30
```

Knowing this is no actual use, though, since a program in sideways memory can never switch itself on by this method. But there are a number of ways that programs in sideways memory can be called. The operating system makes sure that the right bank is switched on at the right time, so you don't have to worry.

A program in sideways RAM differs from one in normal RAM in three ways: the sideways memory header, handling the sideways memory service calls, and the use of extended vectors. It also needs to deal with errors slightly differently.

The sideways memory header

Each bank of sideways memory has to begin with a particular pattern of data, called the Header. Without this, the software will not work. The contents of

Location	Contents
&8000-&8002	JMP to language entry point
&8003-&8005	JMP to service entry point
&8006	Type byte - &82 or &C2
&8007	Copyright message offset
&8008	Version number
&8009 ...	Program title
&8000 plus contents of &8007	Copyright message

Table 1. Contents of sideways memory header

the header are shown in Table 1.

There are three ways of entering the code in sideways memory: as a language, by a service call or via an extended vector. A 'language' is a program which, once it is entered, remains active until another language is selected. It can be a genuine programming language, like Pascal or Basic, or something like a wordprocessor or a database, and it is bound to be large and rather complex. For a language, the first three bytes of sideways memory must point to the start of the language program, and the type byte at location &8006 should be set to &C2. If you're into writing language programs then you need only check the necessary details in the *New Advanced User Guide* or Bruce Smith's *Advanced Sideways RAM User Guide*.

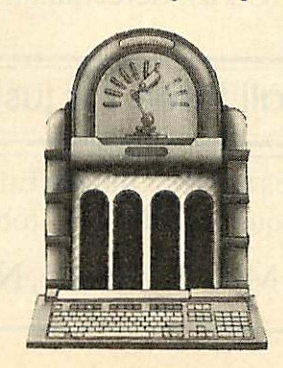
If your program is not a language, then the type byte, location &8006, should have the value &82, and the three language entry bytes should be zero.

The three bytes beginning at location &8003 are more important. At various times the operating system sends what are known as 'service calls' to each of the banks of sideways memory. Every bank has to contain some code to handle these – even if it is no more than an RTS instruction – otherwise the system will crash. Locations &8003 to &8005 must contain a JMP instruction to the start of that code.

You have to include a copyright message, and it must begin with the four bytes &00, &28, &43, &29 (a zero byte followed by '(C)') and the message has to end with another zero.

The byte at &8007 must be set to the distance from &8000 to the first byte of the message. So for example, the zero byte at the beginning of the message is at location &8016, then location &8007 must contain &16.

You might be inclined to leave out the copyright message in programs you write for yourself, but if you do then they won't work. When you switch on the computer, or press Break, the operating system looks at all of the sideways memory slots to find out which of them are occupied. It does this by checking on the first four bytes of the copyright message. This means that if your program does not have a message beginning with the right sequence of bytes, then the computer won't recognise it. Your message doesn't need to contain anything more than the introductory sequence, but it can be a good idea to add something like the date to help keep track of program revisions. Other parts of the header are less important. The version number doesn't matter much either, though you might as well have one. You can often arrange for *Help to print out the title on the screen. On a Master, the *Roms command does this for you.



Sideways memory service calls

Service calls are one way that the computer signals to the programs in sideways memory that something has happened. It's a good idea to arrange your program to take advantage of some of these things. All that actually happens at a service call is that each memory bank is switched on in turn, beginning with the highest numbered one, and each time, there is a JSR to location &8003 (ie, the instruction 'JMP to service entry point' in the header).

When your program receives a service call the A, X and Y registers of the 6502 will contain certain information. The number in the X register will be the number of the memory bank that your program is in. The Y register may contain a parameter. But the interesting number is the one in A, as this tells you what the call is about. If it turns out to be a call which you're not interested in, then your program can just exit with an RTS instruction.

When your program has finished dealing with any service call it is important that the values in the registers are put back, so that the programs in other banks of sideways RAM can respond properly. The only real exception is when your program has dealt with a call completely and you want the other memory banks to ignore it. In this case your program can set A to zero.

There are about 20 service calls in all, and many of them have rather specialised uses. But there are about five that are most useful.

The call with A=1 is issued when Break has been pressed. Its real use is to allow sideways ROMs to make sure that there is enough workspace in normal RAM for their needs. (This has the effect of raising the value of PAGE on the model B and B+.) It is often useful to arrange for your program to recognise Break, and you can use this call to tell when it has been pressed. On a Master, the A=1 call is only used on a CTRL-Break. A new call with A=&27 is used on a normal Break – you should use this instead.

A=4 is the unknown command call. This one is very useful – it means that a star command has been used which the operating system doesn't recognise. The command is always stored in memory beginning at an address given in locations &F2 and &F3 plus the entire contents of the Y register.

This is a way of making your own program respond to star commands. Suppose you want to make your program take some action in response to a particular keyword that you have chosen. All the program needs to do is to compare your chosen word with the text beginning '(&F2),Y'. If they are the same, then your program does whatever it should.

The A=5 call occurs when there has been an interrupt which the operating system cannot deal with. If you are using interrupts, then using this call is a bit simpler than intercepting the IRQ vectors. You must exit with an RTS rather than an RTI.

The call with A=6 happens whenever the computer comes to a BRK instruction. It can often be a good idea to make your program reset itself whenever an error happens (perhaps even including when Escape is pressed). With utilities in standard RAM you can usually do this by intercepting the BRK vector at locations &202 and &203. But because of the way the system deals with errors, this can be awkward for programs in sideways memory. The service call with A=6 gets round the difficulty, and in any case it is easier than fiddling with the vectors.

Finally, if A=9, it means there has been a *Help instruction. Your program does not have to respond to *Help, but I find that it is useful to make a program print out its title at least. This is an easy way of checking that it's loaded correctly.

Extended vectors

If you've done much machine code programming on the BBC micro you have probably used one or more of the vectors –BRKV and EVNTV and so on. The idea of vectors is to make it possible for your program to control almost anything that the computer does. Whenever there is a call to one of the operating system routines then rather than going straight into a routine in ROM, the computer looks at a couple of locations in RAM, known as vectors. The vector contains the address of the start of the appropriate ROM routine.



```
>LIST
   10 REM SW RAM Utility (Basic / Wordwi
se-Plus Swap)
   20 REM By David Harper
   30 REM For BBC B/B+/M/C with SW RAM,
Basic II (and Wordwise-Plus)
   40 REM (c)
   50 :
   60 addr=&B0
   70 fileadd=&B2:buffadd=&B4
   80 :
   90 DATA 82
  100 DATA BASIC / WORDWISE-PLUS Swap
  110 DATA 0
  120 DATA 14th July 1988
  130 DATA 1,SWAP,swap
  140 DATA 2
  150 DATA 1,break,6,iserror
  160 DATA 5
  170 DATA E,newwrchv,10,newrdchv
  180 DATA 12,newfilev,14,newargsv
  190 DATA 1C,newfindv
  200 DATA 500,SWAP
  210 :
  220 READ Type$:Type%=EVAL("&"+Type$)
  230 READ Title$,Version%,Copyrt$
  240 READ NumKeywds%
  250 IF NumKeywds%>0:PROCReadKW
  260 READ NumSC%
  270 IF NumSC%>0:PROCReadSC
  280 READ NumVects%
  290 IF NumVects%>0:PROCReadXV
```

Sideways RAM header program listed in Basic. Type *Swap to switch to Wordwise Plus

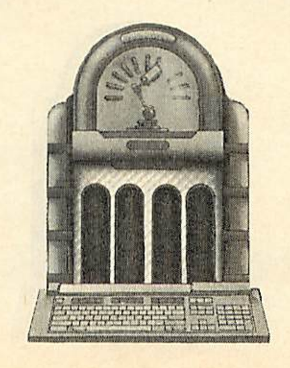
This means that if you want something else to happen whenever one of the OS calls is made, all you need to do is to change the contents of the appropriate vector so that it points to a routine in your own program.

This is quite simple if your program is in normal memory. If it is in sideways RAM, it doesn't work, because when the OS call happens, the current memory bank might not be the one with your program in.

But in addition to the normal vectors, each of which is two bytes, there is also a set of three byte vectors known as extended vectors. In each of these, one byte is used to indicate the number of the sideways memory bank, and the other two are the address - as is this case in a normal vector.

Using the extended vectors is exactly the same as using the normal ones, but they are a little more fiddly to set up. There are three things you need to do.

First you need to find out where the extended vectors are. Unlike the standard vectors, which are always at the beginning of page &2, the extended vectors may be in different places. To find where they are, you use Osbyte call with A=&AB, X=0, Y=255. On return, the location of the extended vector table will be in X (low byte) and Y (high byte). This Osbyte call will, of course, give you the same result every time, so you could do it once and for all, and use the result.



But if you are writing a program to be usable on any micro, it's better to make your program do the call when it sets up its vectors.

After you know where the vectors are, the normal page &2 vectors have to be set up differently from normal, so that when the OS call is made the machine looks at the extended vectors. Think of the vectors being numbered: the vector at &200 is number 0, the one at &202 number 1, at &204 number 2 and so on – so that the vector number is half the low byte of the vector address. For any extended vector you want to use, you must make the page &2 vector point to &FF00 plus three times the vector number. Suppose you want to intercept Oswrch at &FFEE. The vector is at location &20E, so its number is 7 (half of &E). Three times 7 is &15 (21 in hex), so you must write &15 to location &20E and &FF to location &20F.

Next, you need to set up the extended vector itself. Each one takes up three bytes, the vector you want will be at the location given by Osbyte &AB plus three times the vector number. For Oswrch, if the extended vectors start at &D9F, then the right loacation is &D9F+&15, or &DB4.

Once you have this address, set it up by making the first two bytes point to the address of your routine (just as you would with a normal vector), and in the third byte put the sideways RAM bank number. Your program can find this in the X register when a service call arrives. It can also be read from a copy of the bank number the system keeps in &F4.

All this sounds rather complicated, but in fact it is not too difficult.

Error handling

The usual way that machine code programs deal with errors is with the BRK instruction. The normal pattern is that the BRK itself is followed by a byte that contains an error number and then the error message text, terminating with a zero byte.

Handling these errors, printing out the message and so on, is not done automatically by the system. It is controlled by the current language. When the machine comes across a BRK, it issues a service call with A=6, then switches in the current language before it jumps to the location pointed to by the BRK vector. If the BRK were to lie within your program, and the language in a different sideways RAM bank, then the error routine wouldn't be able to read the error message correctly.

The normal way around this is to copy the whole error sequence into normal RAM and then jump there. You could use any vacant area, but the usual place is the bottom of page &1. So when your program detects an error it should write a zero to location &100 (0 is the opcode for BRK), put an error number in location &101, put any error message beginning at location &102, end with another zero, and then do JMP &100.

If you want to do anything special with errors that aren't your own, it is almost always best to deal with it with service call 6.

Zero-page workspace

Finding enough zero-page workspace is always a problem for machine code programmers. Locations &70 to &8F are left free by Basic, but other languages like wordprocessors can and do use them. So general purpose utilities have to avoid this area.

Locations &A8 to &AF are for your own star commands, but there are only eight bytes here and you may need more. There are other areas you can use – for example &B0 to &BF is often used by sideways programs. And &C0 to &CF often seems safe. But these locations cannot be relied on, as lots of other software uses these locations too. Areas of Econet workspace are often safest on non-networked machines. You can't expect any of these locations to stay the same while your program isn't in use – they're only really usable for temporary storage because so much other software uses the same memory.

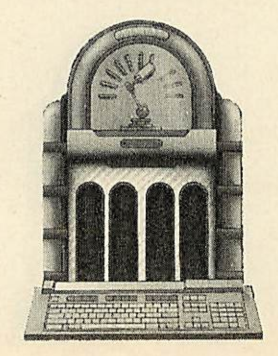
The first section of listing 1 on the yellow pages, up to line 10,000, forms a general purpose sideways RAM program. You can use this as part of any of your own programs, whether or not you are interested in the Swap utility itself. If you study the whole of the listing, though, you'll be able to see more easily how the control program works. The swap utility starts at line 10,000.

If you include the control section within one of your own programs it does the following. It provides the sideways memory header. It intercepts service call 4, checking whether any star command is one of your specified keywords, and if so it executes your program. Note that it doesn't allow for any parameters to be entered with the keywords: You'll have to alter the program a bit if you want to use keywords with parameters. It prints the program title whenever *Help is entered. It intercepts any other service calls you wish to use. It provides routines for setting up extended vectors, and for replacing the original values. Finally, the listing will provide a simple technique for handling errors.

To use it you simply add your own coding to the end of it, along with the necessary information in DATA statements. You need to supply the data in the box at the beginning of the program.

Note that all hex numbers are entered without the initial '&'.

In addition to this you also need to add any assembler labels that you require: zero page locations, operating system



DATA BOX

A. The program type in hex (82 or C29)
B. The program title
C. The version number
D. Copyright string, minus initial '(C)'
E. The number of keywords to be recognized
F. For each keyword:
 (i) The word itself
 (ii) The address label of the start of the coding that deals with it
G. The number of service calls (other than calls 4 and 9) to be intercepted.
H. For each such service call:
 (i) The call number in hex
 (ii) The address label of the start of the coding that handles the call
I. The number of vectors to be intercepted
 (i) The page 2 offset of the vector in hex (ie, twice the vector number)
 (ii) The name of the address to which the extended vector is to point
J. The size in hex of the memory block into which the code is to be assembled. This is used in a DIM statement, and must be a number larger than the total code size.
K. The filename under which the code will be saved.

BBC MICRO VECTORS

Address	Vector	Number
&200	USERV	0
&202	BRKV	1
&204	IRQ1V	2
&206	IRQ2V	3
&208	CLIV	4
&20A	BYTEV	5
&20C	WORDV	6
&20E	WRCHV	7
&210	RDCHV	8
&212	FILEV	9
&214	ARGSV	10
&216	BGETV	11
&218	BPUTV	12
&21A	GBPBV	13
&21C	FINDV	14
&21E	FSCV	15
&220	EVENTV	16
&222	UPTV	17
&224	NETV	18
&226	VDUV	19
&228	KEYV	20
&22A	INSV	21
&22C	REMV	22
&22E	CNPV	23
&230	IND1V	24
&232	IND2V	25
&234	IND3V	26

routines like Oswrch, your own code and a final] and ENDPROC.

Writing programs using the control coding is very easy. For any keyword that your program is to respond to, you write the code that 'does the business' starting with an appropriate label (which is put in one of the DATA statements). Whenever the keyword is typed in, the control program checks it and uses your program. For example, in the program in listing 1 whenever *Swap is entered, the computer jumps to location 'swap'.

Notice that the program will also respond to *Sw. or *Swap. When the action is completed, it should exit with an RTS. Any sideways memory service calls are set up in the same way (such as in lines 10000 to 10090 in the example program along with the data in lines 140 and 150 - data items g and h).

When you want to set up the extended vectors you are using, then you use the instruction 'JSR claim'. This will write values to the page 2 and extended vectors (which you have specified in the data), so that they point to your own routines. In the example program after this has occurred, in the swap routine, on every call to Oswrch there is a jump to location 'newwrchy'. You can replace the original values with 'JSR unclaim'.

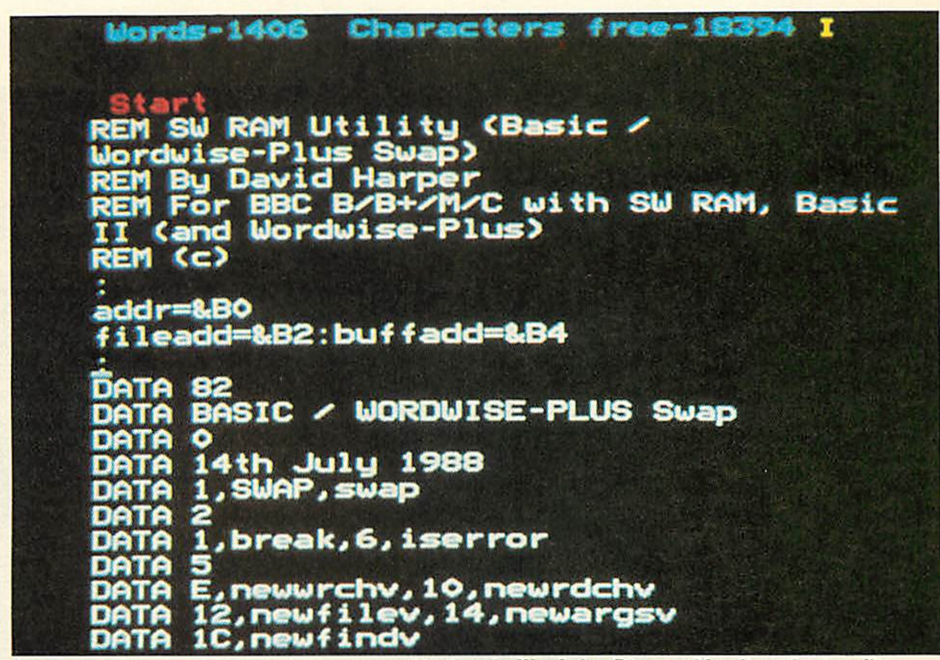
In some applications you may need to use the original vector values – they are stored (two bytes per vector) beginning at location 'oldvects', and the extended vector values (three bytes each) at 'oldxvects'. In each case they appear in the same order as in the DATA statement.

To use the error handling system all you do is replace the usual BRK instruction by 'JSR error'. The JSR instruction is followed by an error number, a message and a zero byte.

Example utility

Listing 1 contains an example utility that shows how all this works. It is a program that makes it easy to edit your Basic programs using *Wordwise Plus*.

Wordwise Plus makes a very good Basic program editor – the only trouble is that you have to be able to swap your program between the Basic and *Wordwise Plus* formats. In earlier issues of *Acorn User* there are descriptions of how to do this by spooling the listing to a disc, swapping between Basic and the wordprocessor, and then reading the spooled file in again. This can be quite slow for a long listing. This utility speeds

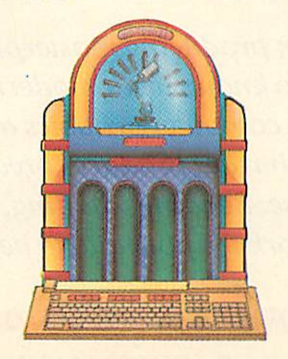


Again the sideways RAM header program, this time in Wordwise Plus, making it easier to edit

it up and makes it safer – because it's totally automated. Once the sideways program is loaded, all you have to do is to enter the command *Swap from either Basic or the *Wordwise Plus* menu and your program will be swapped to the other format.

It works by intercepting vectors. When *Swap is typed in, the program rewrites a number of vectors and extended vectors. It finds which way it is going by comparing the number of the memory slot of the current language with the slot containing Basic.

Intercepting the Rdchv vector makes it possible to feed commands to the computer as though they were entered from the keyboard. When swapping from Basic to *Wordwise Plus* the program is listed, except that Wrchv is intercepted so that the listing is written into sideways RAM rather than the screen (and without the line numbers). It is then loaded into *Wordwise Plus* by modifying Osfile. Going the other way, it is first saved into sideways memory, and then Osrdch is intercepted to feed it into Basic character by character – Basic adds the line numbers itself. There are some slight complications to this. Because of the way *Wordwise Plus* works, you also need to intercept Osargs and Osfind. That's because it makes checks on the size of a file and whether it exists or not before loading or saving.



When it is loading or saving, *Wordwise Plus* does more than simply call the Osfile routine. In either case it first calls Osargs with A and Y set to zero to identify the filing system. It returns the value 4 if the disc filing system is active. It then attempts to OPENIN a file with the specified name to see if it exists already, and when loading, calls Osargs again to check the size of the file and ensure there is enough room in memory. If at any point a file was opened, it is carefully closed again. Next, it gives a warning message if you're trying to load a non-existant or too-big file, or if you're typing to save one that exists already. Only after all this does it actually load or save your text. The swapping program has to intercept Osargs and Osfind to keep control of all this.

The time taken to swap a program will depend on its size. Going from *Wordwise Plus* to Basic is a little over one second per kilobyte. The other way is about three times faster.

Note that this program won't work with the original *Wordwise,* since that loads and saves programs differently, using BGET and BPUT. If you have mastered all that is in this article, though, we believe you shouldn't have any difficulty rewriting it.

DON'T WALK, RUN



We look at the programming language of Wordwise Plus and see how you can lose space to improve it

Chris Robbins

Two of the most widely used wordprocessing packages for BBC micros are *Wordwise* and *Wordwise Plus*. Both provide an enormous amount of text processing power. But *Wordwise Plus* has an additional feature that can increase that power enormously – the built-in text processing programming language.

The language allows you to customise *Wordwise Plus* to suit your own individual needs, and to write any number of special purpose programs to meet specific text processing needs. All this, without in any way interfering with the basic operation of the wordprocessor.

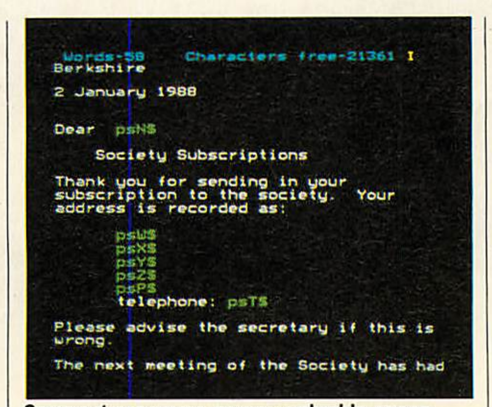
But there is a fly in the ointment. *Wordwise Plus* segment programs, sometimes called 'sprogs', take up space; they use memory that could otherwise be used by the wordprocessor to hold more text.

This can be a serious disadvantage, especially where space is at a premium, and you want all the text space you can lay your hands on in order to hold large documents.

Even with a second processor and the special version of *Hi-Wordwise Plus* (when you are using the BBC micro), it's still possible to find yourself running out of space all too easily.

However, there is an answer; a way of getting more text space without having to forgo the use of segment programs – you can simply reduce the amount of space they take up. But in order to do that, it becomes necessary to get rid of everything that's not absolutely essential to a program's operation.

The first and most obvious things to eliminate are REMs. Programs that don't



Segment programs occupy valuable space

explain themselves are usually a mistake. It's always easier to modify a commented program later.

Getting rid of REMs not only frees some space, it can speed things up as well. It's not merely a question of program size; the *Wordwise Plus* language, like normal Basic, is interpreted. It takes time for the interpreter to discover that the statement it's looking at is a REM, and yet more time to ignore it.

If you must hang on to a few comments in the interest of legibility of your programs, make sure they're not inside sections of code that are going to be executed a lot; avoid using constructs like this:

```
REPEAT
REM
  ...
  ...
  ...

TIMES n
```

where the REM is inside a loop.

That single blank REM tucked inside the loop can add around 70 per cent to the basic loop execution overheads. The more REMs you have, and the longer they are, the greater the overheads. If that REM had actually contained some text, making it up to about 40 characters in length, it could easily add another 7-8 per cent to the overheads. So, eliminating REMs can make programs smaller and speed them up.

Blank lines also take up space. Not a lot perhaps, but it's worth recovering. There's a time recovery bonus with this one as well. If, in the example above, there had been a blank line instead of a REM, the loop overheads would have more than doubled. Two blank lines would double the cost again.

That's not to say that one blank line embedded in a REPEAT loop is going to double the overall execution time; rather that it will increase the effective overheads involved in executing the useful instructions inside the loop. The significance of these overheads will depend on the number of instructions in the loop, and the number of times the loop is executed.

In the *Wordwise Plus* language, spaces are redundant except in strings. They aren't needed to divide one keyword from another. So they too can be dispensed with altogether. Once again there's the added benefit of slightly reduced execution time too.

Having removed REMs, blank lines and all non-essential spaces, your original structured program will look something of a mess. But it will still be readable, just about.

How much space you can save this way rather depends on how the code was laid out in the first place – but you could halve the length of a well-written program in this way.

ILLUSTRATIONS BY ANGELA WOOD

Bold Printing

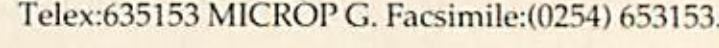
Clean up the quality of your printout with the Juki 6200 daisy wheel printer. With its speed of 30cps, you can create a deep and lasting impression on paper in more ways than one!

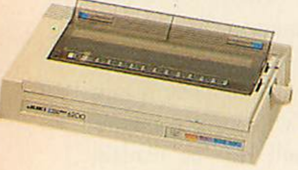
Whatever your printing requirement, the Juki 6200 will produce clean crisp copy everytime and like all of the versatile Juki range, the cost of the Juki 6200 is so economical that the price will wash with just about everybody.

Whilst we wouldn't try to soft soap you into believing that the Juki 6200 can lighten your work load like Bold! We can say that you will be bubbling over with the sparkling printout on your sheets (of paper!)



Intec 2, Unit 3, Wade Road, Basingstoke, Hampshire RG24 ONE. Tel:(0256) 473232. Telex:859669 MICROP G. Facsimile:(0256) 461570.

4 Petre Road, Clayton Park, Clayton-le-Moors, Accrington, Lancashire BB5 5JP. Tel:(0254) 871717.

Telex:635153 MICROP G. Facsimile:(0254) 653153.



6200
This performance daisy wheel printer gives quality printing for all office use. 3K buffer, proportional spacing, parallel interface.
Optional: Sheetfeeder, tractor and serial interface.
Speed: 30cps.
Compatibility: Diablo 630.
Price: £399

6300
A professional wide bodied daisy wheel printer.
3k buffer, proportional spacing, parallel interface.
Optional: Sheetfeeders and tractor.
Speed: 40cps.
Compatibility: Diablo 630API.
Price: £699

6500
A high speed daisy wheel printer designed specifically for high speed office use.
3k buffer, proportional spacing, parallel interface.
Speed: 60cps.
Compatibility: Diablo 630API.
Price: £899

7100
The 24 pin LQ matrix printer.
Dual interfraces, 7k buffer, colour, LCD display.
Optional: Sheetfeeders, tractor and font cards.
Speed: 288cps.
Compatibility: IBM or Diablo 630 or Epson.
Price: £899

7200
The total printing machine
Colour or B/W, 360dpi.
Dual interfaces, A3 printing.
Optional: Sheet and envelope feeders and font cards.
Speed: 324cps.
Compatibility: IBM or Diablo 630 or Epson.
Price: £1625

MINIMUM ABBREVIATIONS

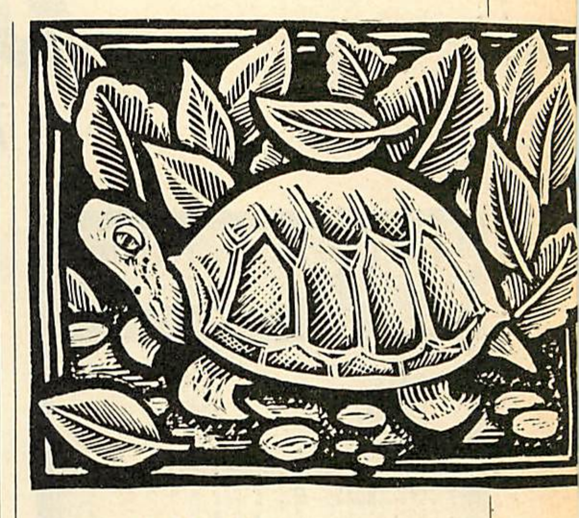
Keyword	Abbreviation	Keyword	Abbreviation
AND	A.	PTR#	PT.(or P. where this does not conflict with possible use as PAGE or PRINT)
BPUT#	B.	RECOUNT	REC.
CALL	C.	REPEAT	R.
CLOSE#	CLO.#	REPLACE	REPL.
CURSOR RIGHT	C.R.	SAVE PARAMS	SA.PAR.
CURSOR LEFT	C.L.	SAVE TEXT	SA.TE.
CURSOR UP	C.U.	SAVE MARKED	SA.M.
CURSOR DOWN	C.D.	SELECT TEXT	S.TE.
CURSOR AT	C.AT	SELECT SEGMENT	S.SEG.
CURSOR TOP	C.T.	SPOOL FILE	SP.F.
CURSOR BOTTOM	C.B.	SPOOL MARKED	SP.M.
DEFAULTS	D.	SPOOL PAGE	SP.P.
DELETE AT	DE.AT	SPOOL TEXT	SP.TE.
DELETE LEFT	DE.L.	SWAP	SW.
DELETE MARKED	DE.M.	TIMES	T.
DELETE MARKERS	DE.MARKERS	TYPE	TY.
DELETE TEXT	DE.TE.	TYPE SEGMENT	TY.SEG.
DELETE WORD	DE.W.	UNTIL	U.
DISPLAY	DI.	VDU	V.
DIV	D.		
DOLINE	DOL.		
DOTHIS	DOT.		
ENDPROC	E.		
EOR	E.		
FIND	F.		
FKEY	FK.		
GOTO	G.		
IF THEN	IF T.		
LET	L.(LET may be omitted completely)		
LOAD PARAMS	LO.PAR.		
LOAD TEXT	LO.TE.		
LOAD TTC	LO.TTC		
MOD	M.		
NEW	N.		
OSCLI	O.		
PAGE	P.		
PREVIEW FILE	PRE.F.		
PREVIEW MARKED	PRE.M.		
PREVIEW PAGE	PRE.P.		
PREVIEW TEXT	PRE.TE.		
PRINT	P.		
PRINT FILE	P.F.		
PRINT MARKED	P.M.		
PRINT TEXT	P.TE.		

FUNCTIONS

Function	Abbreviation
BGET#	BG. (B. if used in the form <variable> =B. <channel>)
CHR$	C.
EXT#	EX.
FALSE	FA.
FREE	FR.
GCF$#	GCF.
GCT$	G.
GLF$#	GLF.
GLT$	GL.
OPENIN	OP.
OPENOUT	OPENO.
PTR#	PT. (or P. where this does not cause confusion with PAGE or PRINT)
STR$	ST.
TRUE	TR.
VARFREE	V.
WORDS	W.

Note – 1) 'abbreviations' are not always shorter than the original keyword eg, the minimum abbreviation for AT is A. In such instances the abbreviation is not given.

Note – 2) different keywords may sometimes have the same abbreviation eg, Page (P.) and PRINT (P.), since the context will determine what it's an abbreviation for (see also use of BPUT# and BGET#)



Keyword abbreviations

The program compression process can be taken even further. You can occasionally compress programs to around a quarter of their original size. Not bad, but how's it done? Well, just as with Basic commands, *Wordwise Plus* commands, functions and other keywords can be replaced by their abbreviations. The list in the box gives all the usable ones.

Replacing the keywords in your program by their abbreviations saves space – unlike Basic. Basic keywords are tokenised when you type them in. That is, each word is turned into a single code byte. Whether you type in PRINT or P., it becomes an &F1 byte. So you don't actually save any space.

But with *Wordwise Plus*, the full text of your program is retained in memory. Tokens aren't used. This means that an abbreviation of PREVIEW FILE to PRE.F. saves six bytes.

It's always worth bearing in mind that the way the original code is laid out not only determines its readability, but it can also affect space requirements and overall program efficiency. For instance, by declaring procedures prior to their use you can increase the program size by a tiny amount.

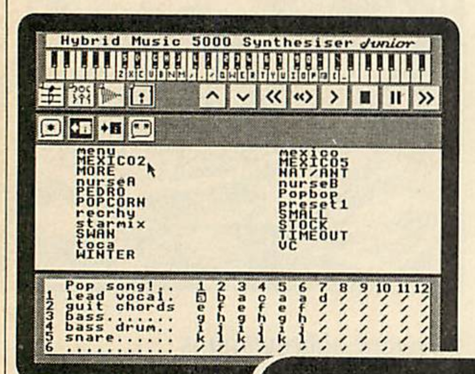
However, depending on circumstances, overall execution overheads may be significantly reduced when the procedures are actually called.

The final message is that it pays to write good, well formatted, and easily understood code to start with. Only when this 'source' code has been proven correct should any attempt be made to compress it.

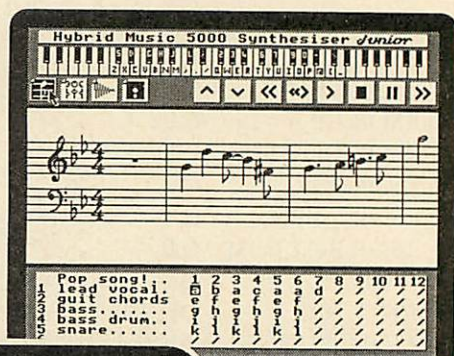
Wordwise Plus *on ROM for the BBC B, B+, Master and Compact costs £56.35 from Computer Concepts, Gaddesden Place, Hemel Hempstead, Hertfordshire HP2 6EX.*

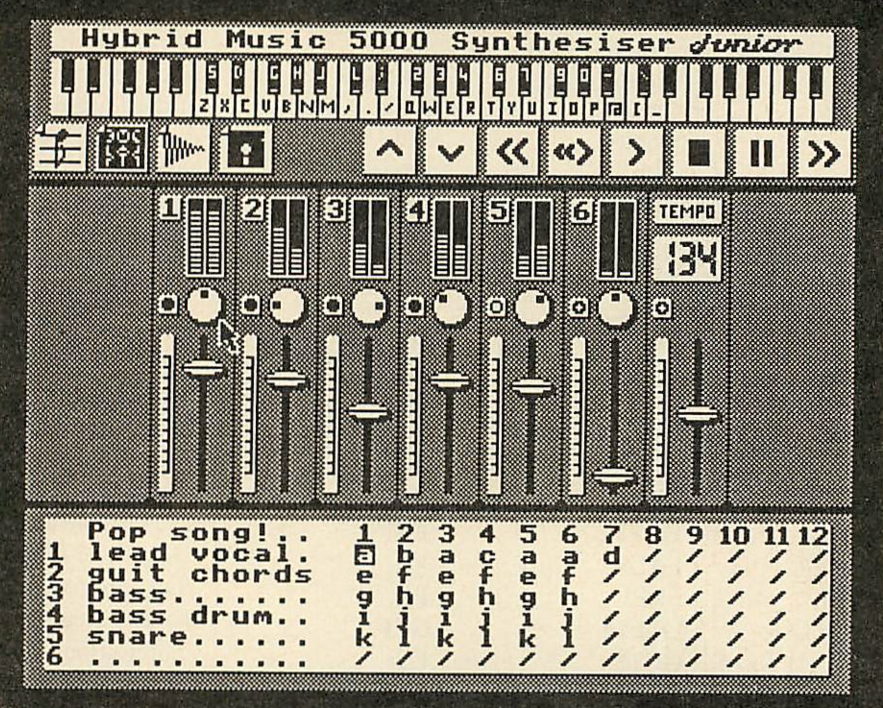
OFFERS

MUSIC MADE EASY









If you have ever dreamt of creating music using your micro but the complexity and expense has put you off, then the new Music 5000 Junior is just what you have been waiting for.

This package gives you the power to create and control complete performances with a wide range of high-quality instrument sounds. This is achieved with the Music 5000 synthesiser and the Junior program ROM, whose high-speed graphics and informative displays make operating it child's play.

The Music 5000 Junior features:

☐ Music keyboard: play single notes and chords over five octaves on the computer keys.

☐ Icon bar: simply position the pointer to flip instantly between the other sections even while the music is playing.

☐ Mixing desk: adjust volume/faders and balance knobs of individual parts when the music plays.

☐ Instrument designer: access to an enormous range of instrumental, percussion, synthesiser and sound effects created through six waveforms and envelopes selected from a bank of 45.

☐ File manager: use disc icons to load and store pieces, moving the pointer to select files from the catalogue.

☐ Music arranger: enter title and part descriptions in the text area and construct the piece by filling successive blank cells simply by using the Staff Editor.

The Music 5000 Junior comes with 32k ROM, full documentation, the 5000 synthesiser unit and connections. The package simply plugs into a BBC model B or the Master 128 and existing amplifier (eg, hi-fi) with DIN lead, and is fully upgradeable to Music 5000 specifications.

The Music 5000 Junior is only £86.09 plus VAT.

Please send me ________ Hybrid Music 5000 Junior package(s) at £86.09 plus £12.91 VAT.

I enclose my cheque/postal order for £99 per pack made payable to **Hybrid Technology Ltd.**

NAME ________________________________

ADDRESS ________________________________

____

________________ POSTCODE ________________

Send this coupon with your remittance to **Music 5000 Offer, *BBC Acorn User* Merchandising, Redwood Publishing Ltd, 20-26 Brunswick Place, London N1 6DJ.**

contex

Archimedes is a trademark of Acorn Computers Ltd.

BANK MANAGER *for disc systems only*
The most advanced and versatile personal bank account management program available for all BBC computers. Consistently acclaimed!

"data entry is a delight... professional... excellent product" – Micro User April '86

Enter cheques and receipts. Standing orders any frequency. Automatic date sequencing. Reconcile statements. Search, amend and delete. Unreconcile. Move forwards or backwards. Analyse expenditure. Forward cash flow forecast. Up to 36 simultaneous 'bank accounts' online, inter-account transfers. 9999 standing orders. 99 analysis categories. 12 actual and 12 budgets per category, over 4,000 postings on an 80tk disc. Reports to screen or printer. Graphics. Foreign currency support. Password. File recovery. Auto exec file. Field editing. Itemised look ahead. Programmable report writer.

Standard Bank Manager for the BBC B, B+ £17.50

BANK MANAGER MASTER *for disc systems only*
Version 2 now available. Includes all of the facilities of the Standard Bank Manager plus ADFS file system support, shadow screens, uses sideways RAM, 40 or 80 column screen reports, improved graphics, m/c windows, function key support and onscreen labels, additional functions added to the already extensive report facilities.

Bank Manager Master for the MASTER and MASTER COMPACT £22.50

ARCHIMEDES BANK MANAGER
All facilities of Master version plus high speed 'native' mode, wild card analysis enquiry, analysis code sort and other enhancements.

"Impressed, ideal, easy to use" – Micro User, March '88

ARCHIMEDES BANK MANAGER £25.00

BANK MANAGER BUSINESS UTILITIES *for disc systems only*
For the 'professional' who also uses the BANK MANAGER to control the business accounts the BUSINESS UTILITIES add double entry trial balance and programmable spreadsheet analysis reports. Generated from cheque and cash transactions keyed into BANK MANAGER. Just pass the reports to your accountant! Available for all Bank Manager versions, state which.

Bank Manager Business Utility Pack 1 £12.00

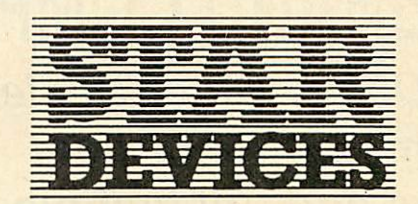
TYPING TUTOR
Quickly learn to touch type. Over 90 smoothly graded lessons graduate you from the basic home keys to complete keyboard mastery. Unique word scan line checking. Target WPM and percentage correct. You may revice the targets or lessons as required. Audio key click for positive key depression. Establish a typing rhythm using the automatic metronome. Free format option. Disc version includes several enhancements eg. on screen keyboard, exact mode, on screen parameters. Recommended.

Cassette £12.50, Disc for BBC B, B+, MASTER and COMPACT £12.50
Disc for ARCHIMEDES (all models) £15.00

ALL PRICES FULLY INCLUSIVE. FREE POSTAGE WITHIN UK.
Enquiries and Access Credit card orders **telephone 023 03 347**

Please state: cassette, 3½" disc, 5¼" 40tk disc, or 5¼" 80tk disc and computer type (B, Compact, Master or Archimedes).

CONTEX COMPUTING
(REF. AU)
15 WOODLANDS CLOSE, COPLE, BEDFORD MK44 3UE



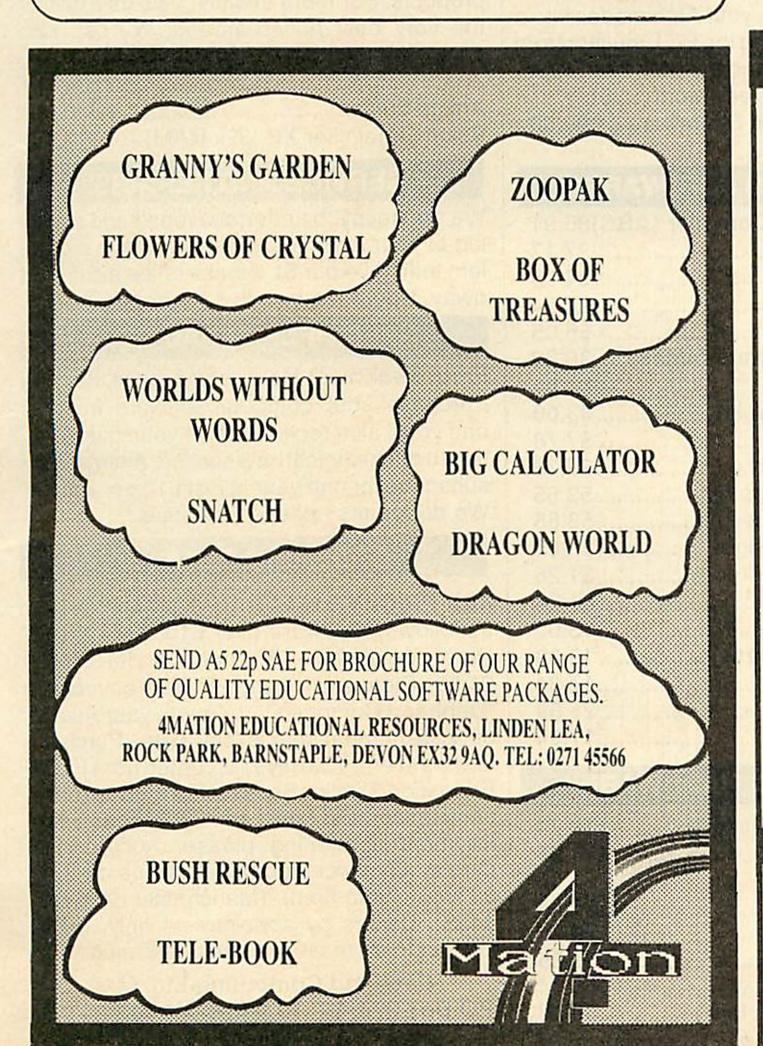
THE CONCEPT KEYBOARD SOFTWARE HOUSE

have moved to

OLD SOLENT HOUSE
111/117, FOUNDRY LANE
SHIRLEY
SOUTHAMPTON
SO1 3GB
Tel: 0703 701694

We are always interested in hearing about your projects using the Star Microterminals Limited Concept Keyboard and will consider publishing software on your behalf.

Please write to DAVID JUPP at the above address.



Succeed with LCL Self-Tuition Courses



THE BEST Highest ever marks in recent review.
Hons. graduate/teacher authors.
World leader (24 countries)

FOR YOU for beginners (from ages 4 to adult), exam candidates or teachers with any BBC Micro (B, B+, Master, Compact, Electron or **ARCHIMEDES** new)

NOW immediate dispatch

£5 off total for 2 courses, £10 off for 3, £17 off for four, £24 off for five

SOFTWARE. Each course includes 24 programs on up to 105 topics held on 2-4 discs/tapes and usually with 2 books and a voice tape and costs only £24.

READING WRITING COURSE	Teaches using moving colour pictures and speech NEW
PRIMARY MATHS COURSE	All animated, colour graphics. Extra two disks available for £5 (4 discs)
MICRO FRENCH (8-GCSE)	With real speech & graphics adventure game
MICRO MATHS (11-GCSE)	Best seller, highly acclaimed
MICRO ENGLISH (8-GCSE)	Eng. Language or EFL with real speech (new enlarged)
MEGA MATHS	A-level course with all Calculus by graphics
HOME COLLEGE	Open learning courses of video, software and books. Choice of MATHS, ENGLISH, or FRENCH. Only £49.99 each

SEND COUPON OR PHONE ORDERS OR REQUESTS FOR FREE COLOUR CATALOGUE AND POSTER TO:
LCL (Dept A) Thames House, 73 Blandy Road, Henley, Oxon RG9 1QB

OR RING (0491) 579345 (10am-10pm)

NAME ________ ADDRESS ________

TITLE ____ COMPUTER ____ Disc/Tape/3½" disc

COMPETITION

Win an Archimedes from WATFORD ELECTRONICS worth over £1000!



In this month's spectacular competition you have the chance to win an Archimedes, the fastest micro in the world, from Acorn's most popular dealer, Watford Electronics.

To enter our competition just answer the seven simple questions below, (you'll find all the answers in *BBC Acorn User* magazines). Then think of a snappy advertising slogan for the Archimedes, fill in the coupon below and send it to us to arrive no later than March 30 1989.

1 Name five computers sold now or in the past by Acorn
2 In which year was Acorn Computers launched?
3 Name the current managing directors of Watford Electronics and Acorn Computers
4 How many 'bits' have the Archimedes, Master 128 and Electron?
5 Which BBC/Acorn magazine has the highest circulation?
6 When was the Archimedes launched?
7 What is the Archimedes' processor called?

The competition will be judged by the editor whose decision is final.

ANSWERS: 1 ________________

2 ________ 3 ________ and ________ 4 ________

5 ________ 6 ________ 7 ________

My advertising slogan for the Archimedes is (no more than 10 words)

____

NAME ________________

ADDRESS ________________

________ POSTCODE ________

SIGNED ________ DATE ________

My computer is ________________

Return to **March Competition, *BBC Acorn User* magazine, Redwood Publishing Ltd, 20-26 Brunswick Place, London N1 6DJ.**

COLOURCEL

NPQ*
INK JET
PRINTER

262,143 MORE COLOURS THAN THE MODEL 'T'

Addressable to
262, 144 colours:
per pixel, 160 pixels per
inch, both axes.
1280 pixels per line.
A4 width internal paper
roll and cutter.
Compatible with Integrex
Fast Frame Grabber.
Centronics Interface.

£2995 exc. VAT



IMAGES BY
MIKE KING
CITY POLY

* Near Photographic Quality

INTEGREX LTD., CHURCH GRESLEY, BURTON-ON-TRENT, STAFFS. DE11 9PT, ENGLAND
TEL: (0283) 215432 TELEX: 341727 FAX: (0283) 550325

TIME TO TAKE STOCK

Is the business market keeping up with the times? In this, the first of two articles, we take a closer peek

Roger Carus

It is almost three years since I wrote a full review of the business packages that are available for the BBC micro in these pages, so it seems a good time to look at what's happened since. The hardware has changed out of all recognition since then, with the arrival of the Master and then the Archimedes.

But what about the software? I started as I usually do by looking at the last few editions of *BBC Acorn User* (and other relevant magazines) to see what had been advertised or reviewed. I also inspected the most recent show catalogue in case I had missed anything and finally I then talked to a few knowledgeable friends in the business. Sadly, it did not produce as much material as I had hoped.

There were only 16 advertisements clearly directed at the business market and perhaps half a dozen more of general use which could be applied to business purposes. This is only about half the number in late 1985. So what has happened?

I went back to first principles and asked myself what was missing? Had people stopped writing the software, or was it that all the likely needs had been met? The answer seems to be somewhere in between. The better products are still around while many others no longer attract so many buyers, and have become uneconomic to advertise. It seemed sensible to start with the hardware, and there is no doubt that the introduction of the Master and Archimedes with their bigger memories, has greatly improved the amount of material the systems could handle. These machines also allow more sophisticated software (in part because they can be ADFS), and nowhere is this more apparent than the new relational databases such as those produced by Minerva Software.

The other aspect of hardware which has changed is in the way disc drives have become more standard, so adding quantity to the capability for processing. Three years ago it was always necessary to comment on the ability of systems to use cassettes, while there are few to be catered for today.

ILLUSTRATION BY TONY SIMPSON

TWILLSTAR COMPUTERS LTD

ARCHIMEDES

Item	Price
305 BASE AKB10	612.00
305 & mono monitor	665.00
305 & colour monitor	827.00
310 BASE AKB15	731.00
310 & mono monitor	783.00
310 & colour monitor	922.00
A310M AKB30	783.00
A310M mono	835.00
A310M colour	975.00
410 SERIES	
Mono	P.O.R.
Colour	P.O.R.
440 SERIES	
Entry System	2210.00
Mono	2263.00
Colour	2403.00
Archimedes/Master Econet	43.00
0.5 MB RAM	127.00
Floppy disk	110.00
20 Mbyte hard disk & podule (300 only)	423.00
Podule Backplane	35.00
Archimedes Pref. Manual	29.95
Assm. Lang Prog Manual	11.00
Archmedes software in stock	
MASTER 128	
Complete with internal Software	346.00
Master Turbo Upgrade	99.00
Master Econet Module	40.00
Universal second processor	75.00
Eprom Cartridge	13.00
Reference Manual Part 1	14.95
Reference Manual Part 2	14.95
BBC MASTER COMPACT ENTRY SYSTEM	
128K *Single 640K Drive* *Bundled Software*	306.00
TV SYSTEM	
128K *Single 640K Drive* *UHF Modulator* *Bundled Software*	319.00
MONO SYSTEM	
128K *Single 640K Drive* *Bundled Software* *12" High Res Monochrome Monitor*	349.00
COLOUR SYSTEM	
128K *Single 640K Drive* *Bundled Software* *14" Medium Res Colour Monitor*	481.00

MONITORS

Item	Price
Phillips BM 7502 12" Hi res. P31 Green Phospher Screen. CVBS input. Audio input Band width 20 MHz. 2000 CHRS Display	68.00
Samsung 12" Mono White	89.00
Samsung 12" Mono Green	89.00
Samsung 12" Mono Amber	97.00
Samsung 14" Mono Hi Res White	97.00
Samsung 14" Mono Hi Res Green	97.00
Samsung 14" Mono Hi Res Amber	109.00
Samsung 14" CGA	249.00
Samsung 14" CGA/EGA	335.00
Samsung 14" VGA	335.00
Samsung 14" Multiscan	355.00
COLOUR MONITORS	
Phillips CM8833 14"CVBS and RGB medium resolution colour monitor. IBM PC compatible. Fast blankup to enable superimposing. Stereo Audio. Ear phone socket. 600 dots x 285 lines vertical	199.00
Phillips CM8852 14" RGB professional med res colour. 700 dots x 285	251.00

PARALLEL T SWITCHES

Item	Price
Parallel T switch (2 way)	15.00
Parallel T Switch (4 way)	25.00
Auto Switch 4-1	69.00

MITSUBISHI DISC DRIVES

Source 100% BBC compatible slimline disk drives. All drives supplied complete with formatting diskette, comprehensive users manual and all necessary cables. All drives are 40/80 switchable and have two years warranty.

Item	Price
5¼" Drives without P.S.U.	
400A Single 400K Double Sided	98.00
SD 802C Dual 400K Double Sided	190.00
5¼" Drives with P.S.U.	
400B Single 400K Double Sided	117.00
SD 802E Dual 400K Double Sided	204.00
SD 802D Dual 400K Drives horizontally mounted in a monitor stand to fit both the BBC B and the Master series	230.00
Mitsubishi Bave drives uncased with 40/80 switch	77.00
WINCHESTER DISC DRIVES	
20 Mbyte	408.00
30 Mbyte	432.00
40 Mbyte	552.00
60 Mbyte	672.00
All Winchester come ready to plug into the Master 128.	
ADFS RAM required for BBC	26.00

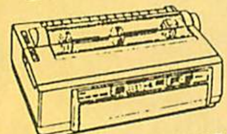


PANASONIC KX-P 1081

Panasonic KX-P1081. .... 135.00

Panasonic The faster and enhanced KX-P1081. 120 cps in draft mode. 24 cps in NLQ mode. Fully Epson RX80 and IBM Matrix and Graphics Printers compatible. Standard friction and tractor feed. Operator accessible print mode switch. Standard 8 bit parallel interface. RS232 interface is optional.

NEC P2200 PINWRITER
275.00 + VAT



CHOOSE YOUR FREE GIFT WITH EVERY NEC P2200

2 CHOICES OF GAINING

1. RECEIVE
FREE PRINTER CABLE
FREE PRINTER STAND
FREE 200 SHEETS PAPER

OR

2. RECEIVE
FREE CUT SHEET FEEDER
WORTH £59
(WHILE STOCKS LAST — SO HURRY)

24-pin dot--matrix printer. Letter-perfect print, in several sizes, at 56 characters per seconds (cps). Or switches to draft mode for high-volume outputs at 168 cps. Built-in tractor that permits push or pull feeding.

Print Rate: High-speed draft: 168 cps. Standard draft: 140cps. Letter quality: 56 cps
Printhead: Impact, 24-pin dot matrix.
Input Buffer: 8K standard
Graphic Resolution: Up to 360 x 360 dpi

Item	Price
CUT SHEET FEEDER	59.00
SERIAL INTERFACE KIT	55.00
FRONT CARTRIDGE	25.00

NEC MONITORS
OFFICIAL NEC UK PRODUCTS

MULTISYNC PLUS **695.00**
This 15 inch, high resolution (1024 x 768) monitor is ideal for use with IBM/XT/AT and PS/2 plus Apple Mac II and othe IBM PC compatible microcomputers. It automatically scans all horizontal frequencies from 21.8 KHz to 48 KHz and vertical frequencies ranging from 50 to 90 HZ. It supports EGA, enhanced EGA, PGC, MCGA, and VGA colour graphics standards.

MULTISYNC II **450.00**
This redesigned 14" MultiSync high resolution monitor offers all the benefits of the previous model such as automatic synchronisation, suitable for use with IBM/XT/AT and PS2 plus Apple Mac II and compatible with Hercules, MDA, CGA, EGA, EGA+, PGC, and VGA graphics standards plus front mounted user controls and automatic selection of Analog/TTL and Vertical Hold modes.

MULTISYNC GS **149.00**
Offers the user a high resolution (720 x 480), 14 inch monochrome display which is hardware compatible with IBM PC, XT, AT, and PS/2 machines. The MultiSync GS supports MDA, Hercules, CGA, EGA, MCGA and VGA display standards. It automatically locks on to one of five frequencies from 15.7 to 31.5 KHz to suppport all the above major graphics standards and three vertical frequencies ranging from 50 to 70 HZ.

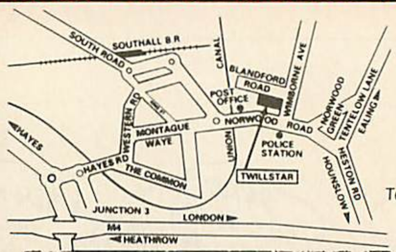
PC ADD ONS

Item	Price
20 Mb Hard Disk	199.00
30 Mb Hard Disk	240.00
20 Mb Hard Card	199.00
30 Mb Hard Card	240.00
Other PC products available.	Call for details.

SPECIAL PACKAGE
Phillips CM8833 Monitor and TV Tuner **249.00**



Maintenance contracts available.
Authorised service centre.
Call for details 01-574 5271



APEX HOUSE
BLANDFORD ROAD
NORWOOD GREEN
SOUTHALL
MIDD UB2 4HD
☎ 01-574 5271 or
☎ 01-571 5938
Telex: 25247 Telex G.attn TIL
Fax: 01-574 4326

You can purchase any of the items listed. All you have to do is write your requirements on a sheet of paper, and we will despatch your goods within 24 hours, subject to availability. Please add the following amounts for Postage and Packing.

Items below 10.00	add **1.50**	Items below 50.00	add **2.50**
Items below 100.00	add **3.50**	Items over 100.00	add **8.00**

(UK Mainland only) All prices exclude VAT. Please add 15% VAT to all orders. Prices correct at time of going to press but subject to change without notice. Please make cheques payable to: **TWILLSTAR COMPUTERS LTD.**
Access/Visa Card Holders: Welcome.
VISIT OUR MEGA-COMPUSTORE OPEN 9am — 6pm Monday to Saturday
CREDIT FACILITIES, we are authorised credit brokers, Typical APR 36%

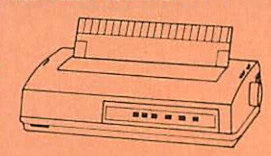
PRINTERS

Item	Price
AMSTRAD LQ3500 dl 24 pin NLQ 160cps. LQ 54CPS. Prints graphics output. Supplied with bolt-on tractor and featuring PC and Epson LQ-1500 compatibility. (Subject to availability)	260.00
AMSTRAD DMP4000 200cps wide-carriage. Inbuilt tractors allow fast paper slew rates, and PC and Epson FX compatibility. (Subject to availability)	250.00
NEW PRINTERS	
AMSTRAD DMP3250 di	169.00
AMSTRAD LQ5000 di	339.00
STAR LC-10	189.00
New enhanced version complete with IBM & Parallel Interface	
Sheetfeeder	POA
STAR LC-10 Colour	219.00
Ribbon	4.70
MP135 135 cps, 80 column printer. Friction tractor feed. NLQ. Epson & IBM Compatible	126.00
EPSON PRINTERS	
LX-800	199.00
FX-800	320.00
FX-1000	399.00
EX-800	420.00
EX-1000	565.00
LQ-500	299.00
LQ-850	449.00
LQ-1050	599.00
LQ-2500+	720.00
LQ-2550	899.00
SQ-2500	969.00
SQ-3500	1199.00
NEC PINWRITER P9XL	
P960XL	885.00
P965XL Serial/Parallel	970.00
NEC SILENTWRITER LC866+/LC890	
LC866+	1870.00
LC890	2995.00
FREE with Silentwriter 12 months onsite maintenance contract.	

NEC PINWRITER P5XL

Item	Price
P565XL Serial/Parallel	*740.00*
Pin tractor	*50.00*
Bi-directional tractor	*125.00*
Single bin cut sheet feeder	*240.00*
Double bin cut sheet feeder	*440.00*
Font cartridge	*40.00*
RAM cartridge	*30.00*

NEW NEC PINWRITER P6/P7



The ultimate matrix printer for business. Print speeds of 265cps in draft and 90cps in letter quality. Inbuilt tractors. A paper park and low tear off facility. Twenty inbuilt fonts as standard. A font cartridge facility for greater flexibility. An amazing 80K byte print bufer. 24 pin printhead. Centronics parallel interface. Compatible with previous NEC 24 pin printers.

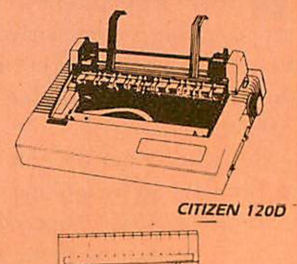
Item	Price
P6+ *80 characters*	*434.00*
P7+ *136 characters*	*608.00*

DAISYWHEELS

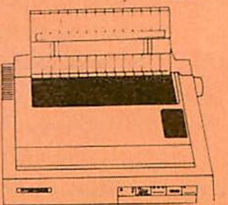
Item	Price
BROTHER HR 20 Daisywheel 8K standard buffer upgradable to 16K. Standard serial/parallel port	338.00
JUKI Daisywheel Juki 6200	320.00
QUENDATA GPR-2000 Print speed of 18 characters per second. Fully Qume compatible. Takes Qume exchangable Daisywheel and ribbons. Selectable 10, 12 & 15 pitch. Supports proportional spacing. Standard friction feed. Tractor/cut sheet feeder and serial interface optional	146.00
CITIZEN Daisywheel Premiere 35 35cps 15" daisywheel. Diablo compatible	399.00

PRINTERS

Item	Price
CITIZEN 120D *Dot Matrix Printer. 120cps NLQ. 2 year warranty. You have to see the quality at this price.*	*117.00*
CITIZEN LSP 100P 120/25cps 80 column Centronics IBM Parallel	138.00
CITIZEN MSP 15E 160/40cps 136 column Centronics IBM Parallel	240.00
CITIZEN HQ P40 80 column. 24 pin. Dual interface.	350.00
Colour Option	50.00
Colour Ribbon	20.00
CITIZEN HQ P45 136 column. 24 pin. Dual interface.	310.00
NEW CITIZEN 180E 175cps Draft Elite. 30 NLQ. 4k Buffer. 2 year warranty.	*169.00*



CITIZEN 120D



CITIZEN HQP40

PRINTERS

The basic means of data processing are the wordprocessor, spreadsheet and database and among these there have been few changes aside from the introduction of *InterWord* and *InterBase*. True, the capacity to process data has been increased with the more powerful and faster machines, but this is where it ends.

In the case of wordprocessing the introduction of *InterWord* and the associated family of software was a significant step with its high power and low cost, and there have been improved editions of *Wordwise Plus* and *View* (particularly *OverView*) to reflect the changes taking place in the basic processing unit.

The use of spelling checkers has become much more general and each has its own virtues. Other packages have disappeared from the scene, but several specific wordprocessors, usually for scientific or language work, have been launched.

Acorn's *First Word Plus* for the Archimedes with at least a megabyte of memory and a suitable printer represents a truly professional package with most of the features likely to be needed by a typist. It also has the ability for mail-merging, and can incorporate graphics work with several documents at once and add footnotes.

These developments have been complemented by the arrival of desktop publishing which takes the idea of wordprocessing a step further. It allows the production of an integrated document, ready for use, in much the way that a full printing service would aim to do. This has created an opportunity for the user to extend the whole scope of work to include text, tabulated data, graphics and even colour. Acorn is soon to release a DTP package for the Arc from the same stable as *First Word Plus*.

The changes in spreadsheets have been less obvious, if only because those which were popular already met the needs of the market, and the addition of more memory and speed was all that was required to allow them to handle vast quantities of data and add-on graphics together with a few statistical functions. *InterSheet* with the help of *InterChart* and *ViewSheet* with *ViewPlot* have done well. Alas, *Ultracalc 2* seems to have disappeared from the market.

The exception to this trend has been *Logistix* from Acorn (£113.85 + VAT) which has clearly taken the idea much further for the Archimedes and combines many of the features of a spreadsheet, time planner, database and makes use of good graphics. The other in this class is Coltonsoft's *PipeDream* which was reviewed in June last year, and though really a spreadsheet with database features, it has the capability to handle text, though not to the full extent of a wordprocessor. Like the reviewer, I can think of many uses for it, but certainly not as a sole text processor.

In the case of the databases the greatest advances have been made with the power of the Master showing clearly what *ViewStore* in its numerous forms can do. It is easy to confuse the reader with capacities, but in actual practice the provision of a hard disc expands a database to a level where no normal user or small business would ever feel over crowded.

It is when the more specialist business packages are examined that the real questions of capacity arise, and it is here that the potential user has to take careful account of whether there is enough space on the disc, hard or soft for his or her likely needs.

I cannot repeat often enough how important it is to think carefully about what is likely to be asked of the system. It does not make sense to use much more hardware or more sophisticated software than you really need, since you not only have to pay for it but you also need to learn to operate it: both of these activities take time, and time costs money. Ingenious programmers and salesmen will not like me for saying this, but choose a dedicated system if you can: one which will do the job you will need done for the next year or two and not much more – and choose the cheapest. Unless your business demands it, or you are sure that it will quite soon, do not worry about saving the odd millisecond!

Most small businesses are mainly concerned about keeping track of customers, stock, purchases and sales. If all goes well, they then need to keep accounts for the Inland Revenue in order to pay both income tax and VAT.

These are probably the main reasons that one of the longest surviving business packages is sold by Micro-Aid. This company recently moved from Cornwall to Ayreshire, and it has been in the business since 1978 selling a wide range of hardware and software by mail order. Director Colin Chatfield is a regular figure at exhibitions, and he sees clearly the benefits of simplicity.

The most obvious product of its business packages is *Account Plus* (£49.95 + VAT) which is available for every model of the BBC and Archimedes and represents amazingly good value as a suite of simple business programs. It uses Basic programming and is slow for processing, but reliable and simple, with the ability to meet most needs. It consists of semi-independent units which are

Account Plus: a reliable and simple program that meets most business needs

CJE micro's

THE ACORN SPECIALISTS

The widest range of Archimedes Hardware & Software anywhere!

ARCHIMEDES

'External Drive Interface' with link option. Fully buffered. THE BEST £30.00. NB. Not all drives are *Archimedes* compatible

'Drive Swap Switch' for above makes external drive 'Ø', internal drive '1'. Ideal for PC Emulator as 5¼" drive becomes A: Internal B: £8.00

'Drive Select Translation Cable' when used with above. **Interface** links in external drive can stay set to 'Ø', saves hassle when moving a drive from a Beeb £9.00

'**DFs Utils**' A quick and easy to use program that will transfer all or selected files from DFS to ADFS and ADFS to DFS. DFS formatter included. £20.00. DFS reader only £13.00

Archie/BBC **'Monitor Switch'**. Plug both a BBC and an *Archimedes* in to an *Acorn Archimedes* colour monitor, £10.00

***Archimedes* ◀ ▶ BBC RS423** link kit including file transfer software. £15.00



P&P £1.00 or as Quoted. TRADE & EXPORT ORDERS WELCOME please enquire for delivery cost.

Phone/Credit Card and Official Orders welcome.

C.J.E. MICRO'S (Dept. AU) 78 Brighton Road, Worthing, W. Sussex BN11 2EN (0903) 213361 (3 lines)

FONTAID

'FONTAID' NLQ Font designer for CANON/TAXAN & STAR NL10/LC10 (Archie version available).

Ring for a leaflet.

SOFTWARE

'Multi Font NLQ' for most printers (SWR workspace version now available). 'INFORM' Sideways Ram information system! *Ring for a leaflet.*

PRINTERS & MONITORS

PRINTERS Star/Canon/Panasonic/Juki MONITORS Philips/Microvitec

Ring for best prices





Special offers on ARCHIMEDES & MASTERS. Ring for details.
Officially approved ACORN/ARCHIMEDES Dealer & Service Centre.
Come to our shop for a demonstration.

available separately. The central unit of *Account Plus* is the *Cashbook* which is available on its own if required (£11.95 + VAT) and provides a double-entry book-keeping function with four columns of analysis into cash, bank credits and the corresponding debits. Any number of accounts can be maintained and grouped as required. The model B will hold up to 350 items in memory. Several files can be maintained individually, but at some inconvenience. More memory on later machines multiplies the capacity.

This may not seem glamorous but *Cashbook* is quite enough for many clubs and societies to maintain their transactions and for some small enterprises. A more elaborate system is its extension to become *Account* (£29.95 + VAT) which offers random access to disc files and so can take up to 2250 entries on a 200k disc and offers cash analysis or bank records together with credit control in a wide range of ledger facilities.

The combined unit, *Account Plus* does all these things and can also generate invoices, orders, credit notes, pro-forma statements and quotations.

At the same time nominal ledgers and addressed statements, drawing on random access mailing to a list of up to 500 addresses, provide for most of the common activities.

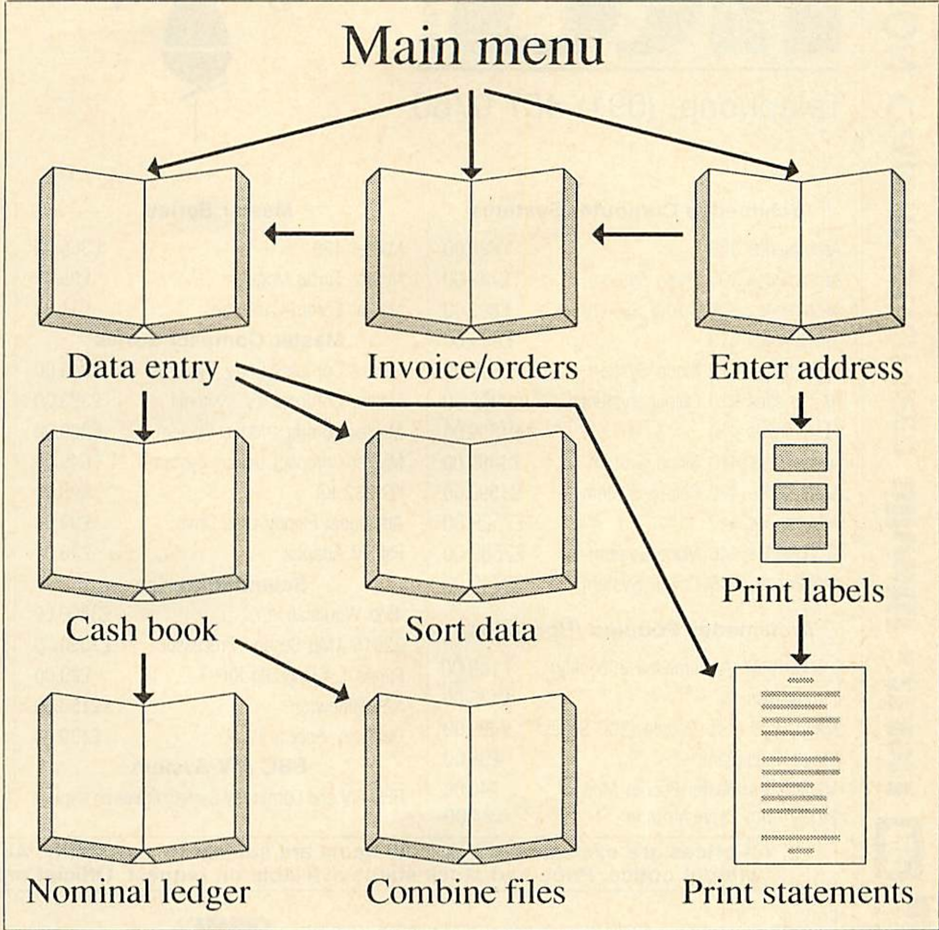
Using the BBC micro with a double-density disc drive, it will cater for 3500 accounts transactions and 1785 sales and purchase addresses. Less disc capacity clearly means proportionately less entries, and it will operate with any printer to produce hard copy.

The documentation is simply and cheaply produced in duplicated A4 format, but it is very clearly written and is, therefore, easy to follow.

There is a more advanced version called *Account Plus Stock* (£79.95 + VAT) in the final stages of preparation which does all the same things and adds on stock control with automatic pricing and some costing ability.

I do not think I would choose it to operate with an Archimedes, although it would work just as well, since that would be a little like using a racing car to go for the newspapers. It would also be a waste of the money spent on the Archimedes unless it was needed for other purposes.

Micro-Aid produces other useful packages for payroll and mailing, as well as the *MicroTrader* and *Micro Stock*. I have



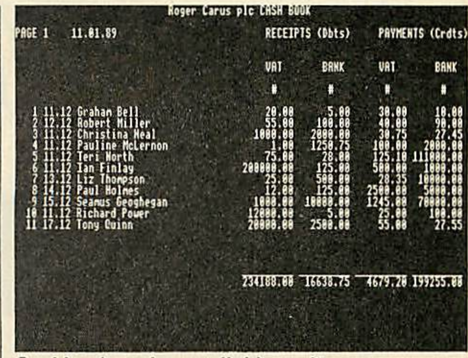
A system diagram of the order in which Account Plus deals with data

not looked at these yet but they seem to offer equally good value.

At this stage it is as well to sit back for a moment and reflect on the amount and type of business that *Account Plus Stock* (since that is probably the version I would choose) would be sufficient for.

Let's assume we're dealing with a trading organisation which sells goods or services to clients who may come back for more, and wants to keep its accounts on an annual basis (ie, new records after a year). With the limits *Account Plus* sets of up to 500 customers and 1785 transactions in the year, more than half of which are sales, it is a sizeable operation. Even if the average transaction is as low as £5 (eg, selling a book by mail order) then that's a turnover of £4,500 a year. Obviously, if the value of the transactions is greater then there is potential for much more earnings.

Furthermore, *Extended Payroll* (£49.95 + VAT) provides both personnel and payroll packages for between 125 and 400 employees giving good facilities. I cannot easily imagine anyone wanting to use it at the top end of its scale since such an employer would have more powerful hardware, but the potential is



Roger Carus plc CASH BOOK

PAGE 1 11.01.89

			RECEIPTS (Dbts)		PAYMENTS (Crdts)	
			VAT	BANK	VAT	BANK
			#	#	#	#
1	11.12	Graham Bell	20.00	5.00	30.00	10.00
2	12.12	Robert Miller	55.00	100.00	40.00	90.00
3	11.12	Christina Neal	1000.00	2000.00	30.75	27.45
4	11.12	Pauline McLernon	1.00	1250.75	100.00	2000.00
5	11.12	Teri North	75.00	28.00	125.10	111000.00
6	11.12	Ian Finlay	200000.00	125.00	500.00	1000.00
7	13.12	Liz Thompson	25.00	500.00	28.35	10000.00
8	14.12	Paul Holmes	12.00	125.00	2500.00	5000.00
9	15.12	Seamus Geoghegan	1000.00	10000.00	1245.00	70000.00
10	11.12	Richard Power	12000.00	5.00	25.00	100.00
11	17.12	Tony Quinn	20000.00	2500.00	55.00	27.55
			234188.00	16638.75	4679.20	199255.00

Cashbook – also available on its own

there. Much the same can be said of the *Random Access Mailing* package (£29.95 + VAT) which can similarly deal with between 525 and 1785 records, which is big business.

I started the first in this series of articles with the highly economical products from Micro-Aid because they provide a useful standard at the cheaper end of the market.

There is a high standard of competition for software competitors which have moved further up the market with better, faster software able to take on more difficult tasks. There is a place for them, and in the next issue their capabilities and potential will be examined.

SPYRO MANIA

We've discovered a neat little program which allows you to create some amazing patterns on the screen of your BBC micro

Steve Maguire

A tiny little program, called *The Rose,* can draw an amazing variety of patterns on your computer's screen. To see some of them, and explore the range of patterns you can create, just type in the listing that we have included in the yellow pages.

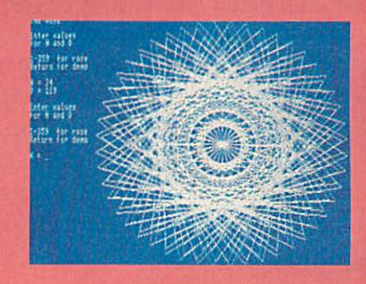
The Spirograph-like patterns are controlled by two numbers, N% and D% in the listing. You must type both of these numbers in. Each must be between one and 359.

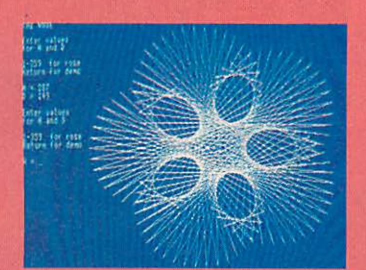
The program includes an input section that allows you to type in the two numbers. Alternatively you can get it to pick random numbers for both N% and D% by using an out-of-range number for either of them – say -1. The final option is a demo mode – just press Return when prompted for N%.

While the computer is working on a pattern, pressing Escape will return you to the input section of the program. If you press Escape instead of entering a value for N% or D%, then the program will end.

Incidentally, PROC@ is a quick-save routine which reads the program title in the same way as the Archimedes' Basic 5. It takes the title from the word after the > marker in the first REM line, and saves the program using this as the filename. PROC@ also updates the version number in the second REM line so you can tell different versions of your program apart.

Finally, if you have a Master 128, then it automatically appends the current date to the version line. Just type PROC@ to save the program.





Three example Rose patterns created by using the following parameters: N=237, D=199; N=24, D=19; N=287, D=149. To add a screendump command, replace END in line 100 with IF INKEY (200)<> ASC"S" THEN END ELSE *SDUMP.

IN LIVING COLOUR

Following just a few simple rules we show you how to get the best from Life

Andrew Green

The Hodgepodge machine offers computer enthusiasts a means of getting more out of *Life*. As regular readers will remember. John Conway's *Life* is a computer model based on a two-dimensional array of cells, which evolve with time in accordance with a set of very simple rules. Each cell in the array can take one of two values – alive or dead.

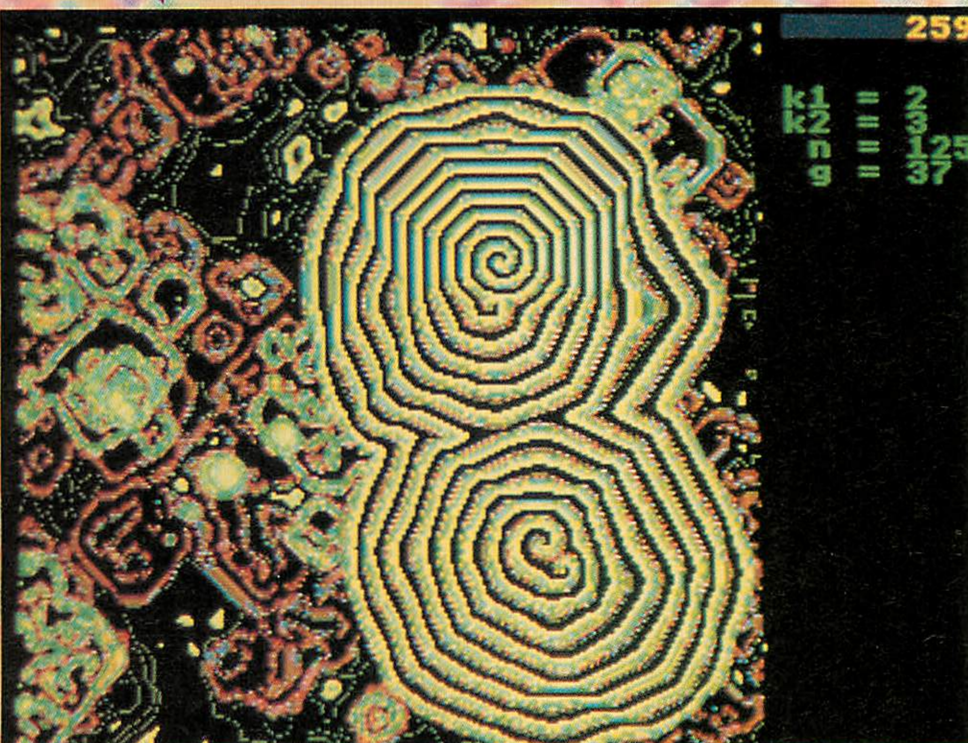
A living cell will only continue to live if there are at least two other cells, and no more than three other cells in the immediate neighbourhood. A dead cell will be revitalised if precisely three of its neighbours are alive – so cells can die of overcrowding or loneliness.

Given these few basic rules, a random initial pattern of living and dead cells is liable to display a complex evolution before eventually dying out or falling into some stable pattern.

In fact *Life* is just one of a variety of models that are generally known as cellular automata. Other variations have been presented in *Acorn User* – most recently Susan Stepney's one-dimensional version in the November 1988 issue.

The Hodgepodge machine offers particular value for money because it is not one but a whole series of cellular automata, characterised by having not just two cell states (alive or dead) but any number of states – the number is purely up to you.

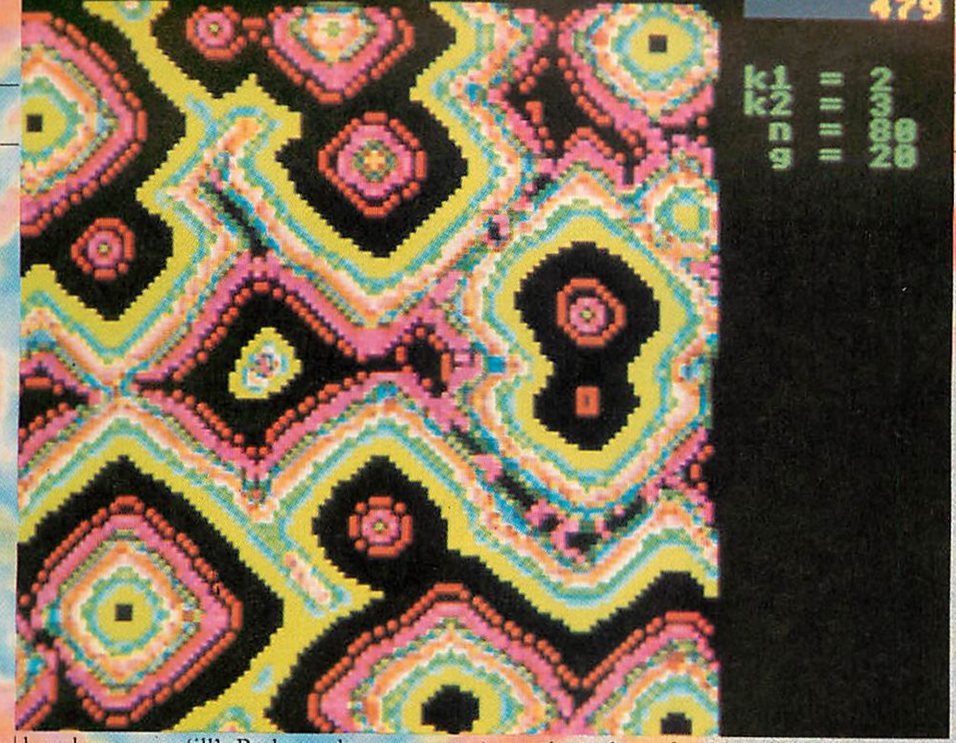
Each possible state is represented on screen by a different colour, which makes watching a Hodgepodge pattern evolve more attractive than the traditional monochrome *Life* patterns. Having settled on a value for the number of states (and a few other parameters), the Hodgepodge machine chooses a random pattern of cells (hence the name) and will display their subsequent evolution. The patterns are striking – particularly the spiralling wave pattern and competing technicolour blooms of cells which eternally burst and die away.



In fact the Hodgepodge machine is much more than just a pretty mathematical curiosity. Scientists have become particularly interested in this form of cellular automation because it seems to closely resemble the behaviour of certain chemical reactions, specifically where heat or particular ions are exchanged between chemicals in solution. A very readable article about the scientific thinking behind the Hodgepodge machine is listed at the end of the article – in fact it was this very article that led to the Archimedes version of the program that's listed in the yellow pages.

Like *Life* or a fractal pattern, it's a program that benefits greatly from the speed and graphics of the Arc. To see the Hodgepodge machine in action, simply type in the listing that is given in the yellow pages.

Each cell of the Hodgepodge model begins in a random state, with a value between zero and the highest state – you control this limit. A cell in state zero is 'dead', and a cell in any other state is 'alive'. All alive cells are 'active', except those that are in the top state; these can



best be seen as 'ill'. Perhaps the states are temperatures, where a cell can die of cold or fall ill through excessive heat.

The state of a cell in the next generation depends on whether it is dead, active or ill. A currently ill cell (in state n, where n is the highest state) will die. If the cell is active (states 1 to n-1), then its future state is given by the formula:

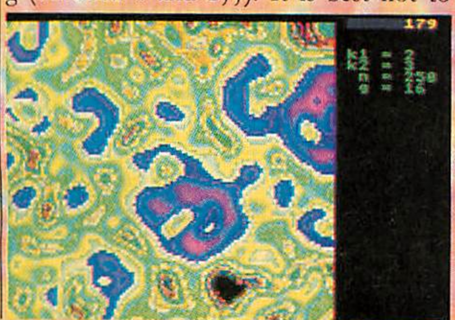
$$(S \text{ DIV } A) + g$$

where S is the sum of all the states of the cell and its neighbours. The number of active neighbouring cells is A (including the cell itself), and g is a weighting factor that determines the speed of change of the pattern. If the cell is dead (state zero), its new state is governed by:

$$(A \text{ DIV } k1) + (B \text{ DIV } k2)$$

where B is the number of ill neighbouring cells and k1 and k2 are constants (in fact k1 is 2 and k2 is 3 in this machine). All the variables and results are integers, which makes the maths a lot faster. Once the values of n, k1, k2, and g are built in to the model, the next generation of the pattern can be calculated from this set of three rules.

The implementation of the Hodgepodge machine listed in the yellow pages provides the option of setting the values of n (something between 2 and 255) and g (between 1 and 255). It is best not to set the value of g higher than the value of n. The two constants k1 and k2 can't be changed.



You'll also be asked to set the cell size as small or large (1 or 2). This determines whether the array contains about 58,000 cells (240 by 240), or only 15,000 cells (140 by 140) – which makes for much faster calculation of each generation.

When selecting each parameter, just pressing Return leaves the parameter at its current value. Once the machine is running however, it will continue until Escape is pressed.

Actually using the program is quite straightforward, and by experimenting with different values of n and g you should eventually be able to recognise some of the distinct forms of behaviour which is typical of the model.

You might like to try some of the values listed in the table below. The pictures give you some idea of what to expect, though they give no more than a flavour of the movement of the patterns.

You'll find it necessary to run the program several times before you appreciate the dynamism in the patterns, and see wave structures spiralling and sweeping across the screen.

Reference: 'The Hodgepodge machine makes waves' by AK Dewdney, P 86-89 Scientific American, *August 1988 (v 259 ii).*

VALUES FOR N AND G

n	g	n	g
250	80	125	37
250	75	100	25
250	63	50	50
250	10	50	15
250	1	10	2
		10	1

PROGRAM DETAILS

PROCinterrupt is called when Escape is pressed. It gives you the option of rerunning or leaving the program to go back to Basic.

PROCinitialise sets up the global variables and allocates default conditions for n and g. It also checks the memory position of the screen RAM that's used to store and display the cell arrays. It needs to do this because direct screen access is used for speed.

PROCprocess is the main procedure. This loops indefinitely calling the machine code routine 'hodgepodge'. One screen bank is displayed while the other is being recalculated and updated. The finished bank is then displayed and the first used for the next generation. This eliminates any flicker on the screen as the array is being changed.

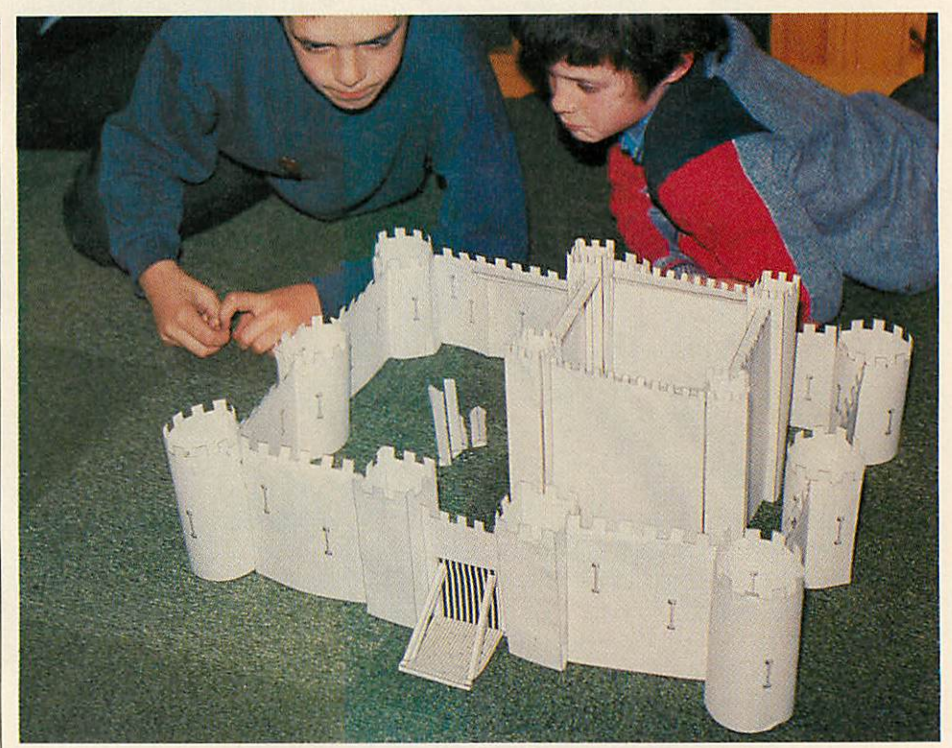
PROCinquire asks you for the values of n and g, and the cell size.

PROCcheckscreensize finds out if there is enough screen RAM allocated to allow two screen banks. If there isn't you'll need to change the configuration of your machine.

PROCshowparams is used to write the current values of k1, k2, n and g to both screen banks.

PROCsetuphodgepodge allocates a random initial value to each cell of the machine. This procedure runs rather slowly.

PROCassemble contains the ARM machine code which performs the calculations for one generation of cells and plots the results on the second of the two screen banks. The code is tuned for speed rather than elegance.



CUT OUT AND KEEP

There's a completely new idea on the education software market – where children can become rulers of the castle

Chris Drage and Nick Evans

It's not often that something completely different arrives on a software reviewer's desk, but Data Design's *Designer Castles* is just that. It not only provided the inspiration for this article, it also occupied my two junior-aged children for hours. The object of their attention was a package that allowed them to design castles using a variety of standard features such as towers, walls, gateways and buildings, and print them out in kit form.

Designer Castles consists of three main elements: a comprehensive, ring-bound manual; master program disc, and a printer support chip. The builder needs to supply a data disc, large quantities of fanfold paper, scissors and glue as well as any paints and strengthening card that may be felt necessary. The publishers stress that they find fanfold listing paper quite adequate for most castle-building.

The program is controlled from a Wimp environment (windows, icons, menus and pointers) which means that all options are selected by 'clicking' on symbols on screen. Although the program is best used with a mouse, it is possible to use the keyboard's cursor keys.

The beauty of the software is its rapid learning curve – any user may become familiar with nearly all its principles with only a few minutes' tuition. The principles to be learned are, first of all, the method of pointing at and clicking on icons. The second principle is the first of the main design approaches embodied in *Designer Castles* – the idea of examining a design on more than one plane.

Castles are built up by creating strings of towers, walls and gateways in the bottom elevation box. Into this box, copies of the various elements of the castle wall are transferred and built up as complete units, ready to be transferred onto the main 'plan' view in the large design box (figure 1). The elements may be inserted at any position in the wall and redundant units may be consigned to the 'bin' which operates with a loud and satisfying scrunch!

A 'fine tune' feature exists whereby a second click on the mouse moves the wall a further five degrees. At this point, a minor criticism, I did find that the pointer was sometimes rather choosy about its position for accepting a 'click', and it was necessary to click again to get things moving. However, it is more a question of getting used to the software and its sensitivity than anything else.

Once the wall is in place and 'fixed' it may be modified by transferring it back into the elevation editing window and replacing it on the plan screen. Thus errors of design may be corrected.

The excellent manual gives details of all dimensions for the various pieces of the castle-maker and consequently a properly executed and planned design should, in theory, work. As most people discover, the trial and error method is preferable for some activities since theories may be tested and modified until the required result is found.

The elements of the wall are selected from the row of images (icons) down the right-hand side of the screen. There are three sets of images available – walls and towers, buildings and siege weapons. It is the child's task to string these elements together to represent either an imaginary castle, one that they are trying to replicate, or one which is designed to fulfil a specific need.

Once a satisfactory plan is finished, it can be printed out in both elevation and plan form. These two print-outs act as the blueprint for making up the pieces when they have been printed.

Printing may take place in one of two ways. Either the user continues to work direct from the editing screen and selects the print option, or the full-blown print quality may be chosen from the start screen on booting up the system. In both cases all the options are chosen by mouse click – which file to print and the size of the print-out – then the system takes over. Since printing the pieces is a

particularly long process, especially for large castles printed in large size, the computer is tied up for a great deal of time. So the user might know what is going on, a status screen displays whose work it is, which piece is being printed and whether it is in the loading or printing stage. The publishers recommend that printing should be done at times when the computer is not normally in use, and encourages children to save work to disc for later printing. Indeed, if they do not save it to disc, the final design is destroyed by the printing process. As with all other 'dangerous' aspects of this package, possible pitfalls are well signed and yes or no choices are offered for confirmation of potentially destructive actions.

Where does this software fit into the educational scheme of things? First reactions might be that this is a history package and that's that. However, in a primary school this software is more likely to be used as part of an integrated project covering many curricular areas with a specific historical theme as its central focus. Examination of Fernleafs' excellent history resources catalogue shows how this approach is spreading.

To succeed pupils must first conceive the elements of their castle, make planning decisions about its individual parts, create a design and then finally build it. So that it might be successful in terms of its proportions, the children must work out dimensions and scales and apply them to the pieces of the castle jigsaw.

Judging by the enthusiasm of my children for this software there is likely to be little difficulty in extracting exciting written work from pupils, based not only upon the castles created, but also around the actual building process.

There are further fundamental issues about the CDT element of the package. By modifying the principles of the design it is possible for the children to create wholly new environments not dreamt of by the software writers. How, for example, would this software be used to design a castle built on the slope of a hill? How would one make the tower of a particular castle that looks unlike the elements provided?

Furthermore, there are questions relating to children's problems in dealing with the materials. For instance, how does one cut out the castle accurately but quickly? How does one best stick the elements together, colour them appropriately, strengthen the structure, modify it or make it look like this or that castle?

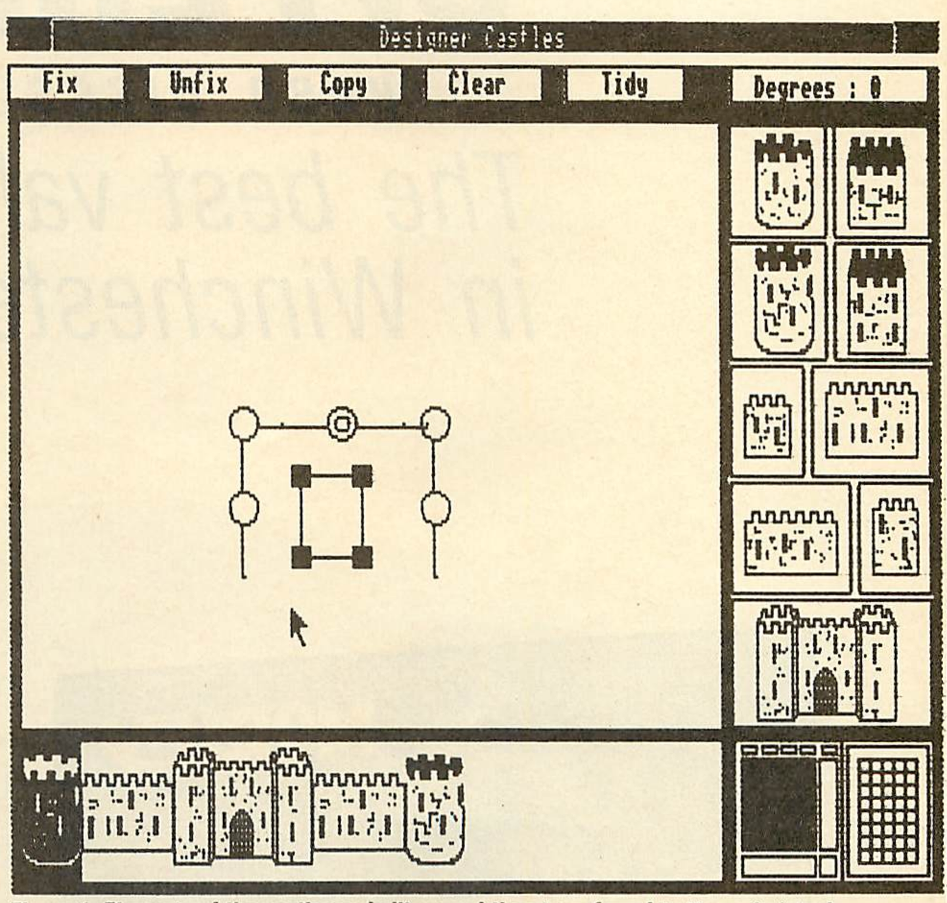


Figure 1. Elements of the castle are built up and then transferred to the main 'plan'

The limitations for design problems are very broad, despite the apparent closed nature of the environment. In this respect, teachers need to experiment with the software themselves so that they may gain an impression of the breadth of possibilities as well as familiarise themselves with its facilities.

One final point is that castle files may be uploaded on to a TTNS database, where they are stored for public access. So, for instance, should you wish to have a replica of Dover castle without the bother of designing it, you may download some other school's effort and print it out straight away. Details about this may be had by typing Castles at the menu prompt on TTNS. Data Design may also be contacted on TTNS and welcome comments and suggestions.

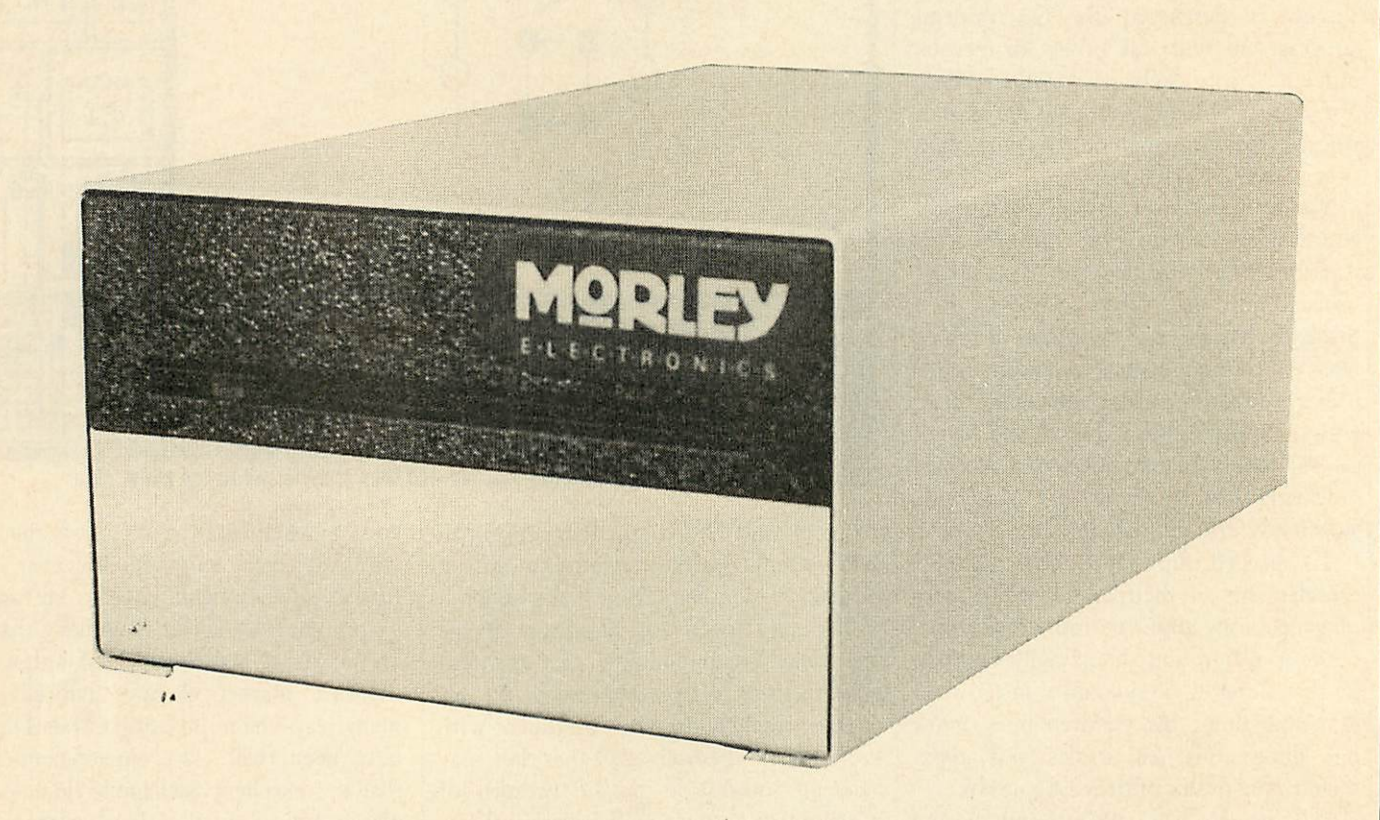
Data Design has plans to create elements of a medieval village to complement the package. There also seems to be plenty of scope for designs of monasteries, manor houses, cathedrals and churches as well as such things as bridges, Greek temples, Roman villas and a whole wealth of other architectural, historical and environmental topics. As is the case with all such software however, the further developments have to be funded by present sales and it is unlikely that all of the above will be tackled unless the software market changes radically. In many ways the publishers at Data Design have been their own worst enemies in that this excellent package is ridiculously priced. Indeed, further developments will be driven by the same printing software, and therefore the coming generations of this exciting software are likely to be even cheaper once you have bought the first package. This concept of using a central workhorse program as a common element for related packages is not new – AMS, for example, used it successfully with the AMX mouse programs. In this instance however, it is providing a design and discovery environment, the like of which has not been seen on a BBC micro in primary schools, and its use in secondary schools will undoubtedly help to cross those curricular boundaries which seem so impossible to bridge.

Designer Castles *(£30 + £1.60 postage, excluding VAT) from Data Design, Gowanbank, 3 Botham Hall Road, Longwood, Huddersfield HD3 4RJ. Tel: (0484) 653176. TTNS 01:YNK134*

OFFERS

HARD DISCS

The best value in Winchesters



We were so impressed by the value of the Morley Winchester that we have negotiated a reader offer on the complete range. Start using the fast efficient way to save data this year by sending off for your Morley Winchester today.

This range of Winchester drives is compatible with all BBC, B+ and Master computers fitted with ADFS. Each unit comes complete with a utility disc containing useful routines including Format, Verify, Archive, and a full ADFS initialisation program.

These state-of-the-art units come complete with a high quality colour co-ordinated metal enclosure with whisper quiet internal fans, a 35 watt switched mode power supply and a 1Mhz bus socket to allow daisy chaining of other devices. This range of Winchester drives is superb quality at an unbeatable price.

As with all Morley products these drives come with the renowned after sales service and full 12 months no quibble guarantee which have become the hallmark of this company over the last five years.

Please send me

☐ 20 Megabyte Winchesters at £370 + £56 VAT
☐ 30 Megabyte Winchesters at £420 + £63 VAT
☐ 40 Megabyte Winchesters at £500 + £75 VAT
☐ 60 Megabyte Winchesters at £575 + VAT

I enclose my cheque/postal order for £________ made payable to **Morley Electronics Ltd.**

Please charge my Access/Barclaycard £________

ACC NO ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

EXPIRY DATE ☐☐☐☐

NAME________

ADDRESS________

____

________ POSTCODE________

SIGNED________

Please send this coupon with your remittance to **Winchester offer, *BBC Acorn User* Merchandising, 20-26 Brunswick Place, London N1 6DJ.**

Sciways for Scientists

- Over 350 defined characters accessible with simple 2-key codes
- All characters printable on both screen and printer
- User defined characters can be stored on disc
- All facilities can be used with word processors or with BASIC
- Tested with BASIC I & II, Wordwise, Wordwise Plus, View 2.1, View 3.0, on the Master 128, B+ & Model B, and with Epson /compatible printers

GREEK ALPHABET: Upper and lower case, upright and italic

Α Β Γ Δ Ε Ζ Η Θ Ι Κ Λ Μ Ν Ξ Ο Π Ρ Σ Τ Υ Φ Χ Ψ Ω

SCIENTIFIC CHARACTERS: Mainly mathematical but also chemical symbols

H-C-C-C —oxidation→ H-C-C-C $\{z: \arg\left[\frac{z-1}{z-3}\right] = \pi\}$ $\int_0^{2\pi} \theta^2 \, d\theta$

See Review in April Acorn User:
"first class product - nobody should be without it"

Orders accepted from schools, colleges, establishments, etc.
Private orders – cheque with order, please

PRICE £39.95 inc. VAT, p & p
16k ROM, 40/80 disc & manual
(not compatible with Inter-Word)

Mayhew Telonics,
376a Ringwood Road,
Poole, Dorset BH12 3LT
Tel: (0202) 747 695



We offer a unique inspection copy service

Call us for full details today!

Have you spent long hours struggling with the programming complexities of the brilliant Archimedes WIMPS system?

With **ARCHWAY** that's all behind you. Now YOU can easily and quickly build multi-window programs with pop-up menus, icons, mouse control, etc. of a professional quality.

ARCHWAY provides tools, bricks, mortar and a basic structure. YOU slot the final bricks into place and add finishing touches.

A comprehensive suite of integrated tools lets you define and edit windows, menus, icons, dialogue boxes, mouse pointers, sprites, fill and line patterns, anti-aliased fonts, short cut keys and much more! You can import files (eg ARM machine code and music editor).

The bricks include an extensive library of functions and procedures providing ready access to many of Archimedes' most powerful features.

An in-depth user guide (300+ pages, ring bound) takes you gently step-by-step through a progressive series of program building examples with the emphasis on clarity.

The ARCHWAY run-time package together with script shells in BBC BASIC provide the structure.

£79.95 incl. VAT & p/p

The complete system comes on 4*800k discs (3 tools & 1 run-time). You need 1M of RAM to run the tools. One disc drive is sufficient.

SPECIAL INTRODUCTORY OFFER: No charge for upgrade to the extended RISC OS (Arthur 2) version we will release in 1989.



Programs to help you

4 CLARENCE DRIVE, EAST GRINSTEAD, WEST SUSSEX RH19 4RZ   Telephone (0342) 328188

Cheques/POs/official orders or Access/Visa number and expiry date.
24-hour 'phone for Credit Card orders.

CARE ELECTRONICS

800 St. ALBANS ROAD, GARSTON, WATFORD, HERTS. WD2 6NL TEL: 0923 672102

For your convenience first price Ex VAt, second Inc VAT

CARE MASTER SMART CARTRIDGE

At the press of a button halt any program running and execute any one of a host of useful built in, or user defined functions and once completed will return to the program and continue. Built in functions include: Tape to Disc, Screen Dump to Disc or Printer, Sound On/Off, Autosave and much more £30.00 £34.50c.

CARE 32K BATTERY BACKED RAM CARTRIDGE FOR BBC MASTER (Only)

For use as a 32k Sideways Ram or plug Spellmaster in and have User Dictionary 16K (Battery Backed) all on the same cartridge. With White Protect Switch and a battery life of approx 10 years £35.00 £40.25c

CARE MASTER ROM CARTRIDGES

ALSO SUITABLE FOR INTERWORD AND SPELL MASTER

Item	Ex VAT	Inc VAT
Standard Cart takes two Roms	£9.00	£10.35c
Standard Cart with Single Zif	£13.40	£15.41c
Standard Cart with Two Zifs	£17.60	£20.24c
Quad Cart takes Four Roms	£14.00	£16.10c
Cartridge for Two 32K Roms	£12.00	£13.80c
Master Rom Extender for using BBC B Cartridges on the Master-Ideal for schools	£13.00	£14.95c
Morley AA (Internal)Rom Board	£40.00	£46.00d

BBC B ROM CARTRIDGE SYSTEM

Item	Ex VAT	Inc VAT
BBC B Low Profile Rom System	£12.00	£13.80c
BBC B Spare Cartridge	£3.00	£3.45c

BBC B Cartridges can be used on the Master with the master Rom Extender – See above

EPROM PROGRAMMER V2

Programs 8K, 16K, 32K CMOS or NMOS devices voltage selectable 21V or 12.5V. Complete with comprehensive software which includes Rom management system, plugs into the user port £30.00 £34.50c

SPECIAL OFFER
MORLEY TELETEXT ADAPTOR

Comes with 16K ATS Rom, Utilities, Disc, and manual at the un-beatable price of £84.80 £97.52b

LABELMASTER

Uses a variety of print styles and sizes. All formatting is done for you and can accept different label sizes. A comprehensive label printing program that is easy to use for BBC B, Master, Compact and Electron. Please state model when ordering £15.00 £17.25c

CARE PRINTER BUFFER

User definable for BBC B, master on Rom or Disc.......... £14.00 £16.10c

MASTERCOPY

If you need to copy between DFS and ADFS and DFS. MCOPY is it £11.26 £12.95c

PRINTER SWITCHERS

Item	Ex VAT	Inc VAT
Two computers to one printer (or vice versa)	£25.00	£28.75b
Three computers to one printer (or vice versa)	£33.00	£37.95b
Four computers to one printer (or vice versa)	£40.00	£46.00b

Please note that all the above units switch all lines, are suitable for all types of printers and computers using Centronics Parallel and INCLUDE LEAD

Item	Ex VAT	Inc VAT
Six computers to one printer	£60.00	£69.00b
Four to one automatic switcher	£102.00	£117.30b
Eight to one automatic switcher	£128.00	£147.00b

For advice or a quote on your installation please phone

Item	Ex VAT	Inc VAT
User port switcher 2 to 1 off	£33.00	£37.95d
User port switcher 6 to 1 off	£72.00	£82.80b
RS423 Serial Switcher 2 to 1	£20.20	£23.23d

CARE READY MADE LEADS RANGE

Item	Ex VAT	Inc VAT
BBC/Master RGB to Scart (Euro)	£9.00	£10.35c
BBC/Master RGB-7 Pin Hitachi	£7.00	£8.20c
BBC/Master RGB-7 Pin Ferguson	£7.00	£8.20c
Centronics to Centronics Printer	£11.00	£12.65c
User Port Extension lead 0.5M	£9.00	£10.35c
1MHz Bus Extension lead 0.3M	£10.40	£11.96c

Wide range of leads in stock – please phone

Government & Educational orders welcome. How to order: Enclose your cheque or P/Order made payable to CARE ELECTRONICS.

Access or Visa cards welcome. Please allow 7 days for delivery.
Please add Post & Packing - a = £10.35; b = £3.45; c = £1.15; d = £2.30

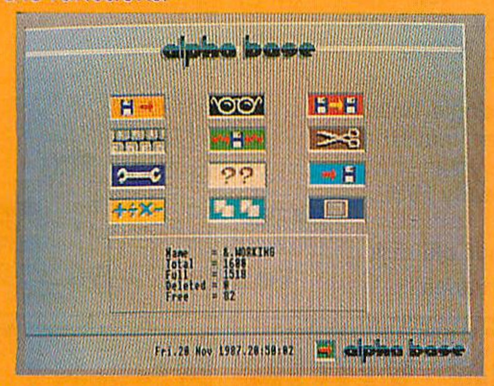




Alpha-Base

£49.95

Alpha-Base is the successor to **Beta-Base,** the top selling database for the BBC micro. Alpha-Base really does **'HARNESS THE POWER'** of the Archimedes. As with all Clares products we have made **Alpha-Base** powerful but easy to use. You can be using a database within 5 minutes of receiving the program - that's easy. But don't be fooled, you do not lose any functions or power. Here are just some of the functions:



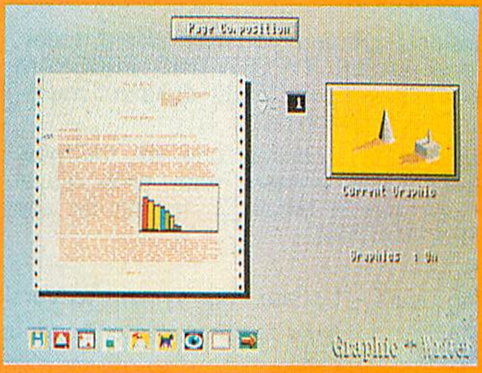
* WIMP based using icons and mouse
* Hard disc compatible - massive files
* Free format screens with on line editing of field order
* Upto 400 fields & 27600 chars per record
* Upto 2.14 billion records per file !!!
* Multiple display, entry and printer forms can be used with each file
* Fast search by fields or record
* Plain English entry of search & sort criteria with many inbuilt functions
* Five data types including formulae
* Calculation facilities with inbuilt min, max, average, age etc
* Comprehensive print options inc labels
* Validation on each field if required
* Transfer fields from one file to another
* Password security if required
* Data stored on disc so computer failure will not result in loss of the data

If you want a powerful database that you can boot up and run within 5 minutes then buy **Alpha-Base** now. Absolutely no programming skills required.

Graphic Writer

£29.95

Graphic Writer, formerly Image Writer, is a sophisticated WIMP based word processor with an inbuilt graphics editor. It can be used as a standard word processor or graphics can be included to provide diagrams, graphs etc within your document. Graphics can even be imported from **ARTISAN**



* Totally icon driven from menus
* Multiple documents in memory, upto 512k
* Super smooth scrolling
* Fast search & replace
* Justify centre etc
* Text styles give plain, bold, italic, underlined, subscript, superscript or combinations of these eg bold italic underlined subscript.
* Centered and Temporary text styles
* Block operations - move, copy, delete and recall
* Full WYSIWYG preview
* Graphics editor
* Page format controls page length, headers, footers, pad and pound characters.
* Page Composition allows placing of graphics, mini preview etc
* Multiple print out options
* Auto page numbering even through multiple documents

To create a document with **Graphic Writer** you type in your text, using the many text styles available, leave room for the graphics and then place the graphics using Page Composition. It's simple and easy to use. You can have up to 14 documents in memory on a 310, that's equivalent to about 220 pages of A4 text.

See what the magazines say:

> the scrollling is unbelievably smooth... I can highly recommend this excellent product as being **THE** word processor for the Archimedes
>
> *MICRO USER April 1988*

> excellent value... bowled over by its stunning use of graphics.
>
> *RISC USER December 1987*



98 Middlewich Rd
Northwich
Cheshire CW9 7DA
Tel: 0606 48511

ALL PRICES INCLUDE VAT and P+P
OVERSEAS ORDERS ADD £4




DON'T FORGET, YOU CAN ORDER WITH ACCESS CARD TOO!

Mijas Software

Bringing the new software world to YOUR BBC Micro

The Professionals choice for 65(C)02 Systems

The Complete Software Development Package For the BBC B and MASTER

Small 'C'

Many times faster than BASIC, 40K+ Program space in stand-alone mode.
Makes testing easier, save time, patience and printer paper.
Full implementation of Small 'C' with BBC graphics extensions.
Professional-style assembler, modular, relocatable, disk to disk.
Full Specification Linker giving compact run-files anywhere in memory.
Full Source Code provided for the 'C' compiler, add your own features!
Source-Level Debug for rapid and effective testing of 'C' or assembler.
Full Library facilities, 'C' and assembler Libraries provided (with sources).
Post-sales support, low cost updates.

Complete System for MASTER or BBC B with 64K of s/w RAM Included on 80T disk Small 'C', Assembler, Linker and Source-Level DEBUG

£50

Check with us for availability on other systems.

New Product

Professional printing you can afford today. Our new LASER TYPESETTING PROGRAM prints multi-window multi-column, multi--page Text & Graphics.

Software £25. Requires one of the new low-cost Laser printers with proportional fonts. Written in Small 'C' to run on any BBC B or MASTER.

Coming Soon

Development system for the new versions on the 6502 as well as the 6502 and 65C02.

Write software for single board computers and other industrial applications using your BBC computer. Available early 1989.

Write for full details or order today from:-

Mijas Software
Winchester Rd.
Micheldever
Winchester
Hants SO21 3DG



Prices do not include VAT



Tel: 0962 89352

Existing Users – Update your system to Version 1.5k – send £5 and your old disk
New features, faster code, updated linker, extended libraries.

SATELLITE PICTURES ON YOUR BEEB!



With one of our high performance weather satellite receiving stations you can receive and display up-to-the-minute weather satellite pictures from American, European, or Russian satellites!

The systems are suitable for BBC models B, B+ & Master

WXSAT — **STANDARD RESOLUTION WEATHER SATELLITE STATION**

A complete hardware and software package comprising MSA20 aerial, MSR20 receiver, and MSS20 decoder/interface with WXSAT software package. In a recent review by Radio & Electronics World Magazine they concluded "*. . . have reviewed four different weather satellite receiving stations in the past two years, varying in price from £400 to around £800, but this one must surely beat the lot.*"

£234.35

MSG20 GRAPHSTORE — **HIGH RESOLUTION FRAMESTORE/GRAPHICS PROCESSOR**

A high resolution (512 pixel x 512 line x 128 greyscale) digital framestore/graphics processor of unparalleled performance. Coupled to the BBC Micro and MSR20, satellite receiver is capable of viewing weather satellite pictures as never before. Powerful features include zooming, scrolling, film mode, text overlay, picture enhancements.

Complete with software package £347.75 + VAT
Complete weather station £767.30 + VAT

ARCH PODULE — **HIGH RESOLUTION ARCHIMEDES BASED WEATHER SATELLITE STATION**

Now available, this system offers users a fantastic high-res satellite decoding package. Features include colour, zoom, scrolling, automatic picture downloading and much more.

Podule only £226 + VAT
Basic weather station £395.50 + VAT
Meteosat weather station £663.50 + VAT

PRICE LIST

	NET	CARR & INS
MSR20 Receiver	132.65	6.00
MSA20 X-Dipole Aerial	26.75	5.00
WXSAT Basic Station	234.35	7.20
MSS20 Interface	74.95	1.50
MSG20 Graphstore	347.75	6.00
MSD20 Dish Aerial	121.50	18.00
MSC20 Down Converter	138.65	1.50

ADD 15% VAT TO ALL ORDERS

PHONE OR WRITE FOR FULL INFO PACK AND PRICES

martelec Remote Sensing



108 Queen's Road, Farnborough, Hants GU14 6JR Tel. (0252) 515666 Telex: 859489 (MARTLC G)

YELLOW PAGES

COMPATIBILITY

Program	Page	BBC B	B+/128	Master 128	Master Compact	Electron	Arc	6502SP/ Turbo	ADFS	Econet	Shadow RAM	Monthly Disc
Hints & Tips	41											
Listing 1		■	■	■	■	■	■	■	■	■	■	■
Listing 2		■	■	■	■			■	■	■	■	■
Arc Agora	46											
Listings 1-3							■		■	■	■	■
Hit and RAM	66											
Listing 1(1) (2)		■	■	■	■	■		■	■	■	■	■
Hodgepodge	78											
Listing 1							■		■	■	■	■
SpyroMania	87											
Listing 1		■	■	■	■	■	■	■	■	■	■	■

Note 1. Requires Sideways RAM. 2. Requires Wordwise Plus.

HINTS & TIPS

See Hints & Tips, page 41

Listing 1. Reflection

```
   10 REM Reflection in X/Y axes
   20 REM by Andrew Pepperell
   30 REM for B/B+/E/M/C/A
   40 REM (c) BAU March 1989
   50 :
   60 MODE 1
   70 C%=0
   80 FOR X%=-1280 TO 1280 STEP 80
   90 GCOL 0,C%
  100 C%=(C%+1) MOD 8
  110 MOVE X%,0
  120 MOVE X%+512,1024
  130 PLOT 85,X%+80,0
  140 PLOT 85,X%+80+512,1024
  150 NEXT
  160 PRINT TAB(5,5) "Reflect X"
  170 PROCreflectx(160,600,448,900)
  180 PRINT TAB(25,5) "Reflect Y"
  190 PROCreflecty(800,600,1088,900)
  200 END
  210 :
  220 DEF PROCreflectx(L%,B%,R%,T%)
  230 LOCAL X%,Y%,C%,P%,D%
  240 C%=(R%-L%) DIV 2
  250 FOR Y%=B% TO T% STEP 4
  260 FOR X%=L% TO L%+C% STEP 4
  270 P%=POINT(X%,Y%)
  280 D%=POINT(R%-X%+L%,Y%)
  290 GCOL 0,P%
  300 PLOT 69,R%-X%+L%,Y%
  310 GCOL 0,D%
  320 PLOT 69,X%,Y%
  330 NEXT
  340 NEXT
  350 ENDPROC
  360 :
  370 DEF PROCreflecty(L%,B%,R%,T%)
  380 LOCAL X%,Y%,C%,P%,D%
  390 C%=(T%-B%) DIV 2
  400 FOR X%=L% TO R% STEP 4
  410 FOR Y%=B% TO B%+C% STEP 4
  420 P%=POINT(X%,Y%)
  430 D%=POINT(X%,T%-Y%+B%)
  440 GCOL 0,P%
  450 PLOT 69,X%,T%-Y%+B%
  460 GCOL 0,D%
  470 PLOT 69,X%,Y%
  480 NEXT
  490 NEXT
  500 ENDPROC
```

Listing 2. Cut & Paste

```
   10 REM Cut and Paste
ROM
   20 REM by Brian Ross
   30 REM for E/M/C
   40 REM (c) BAU March
1989
   50 :
   60 MODE 7
   70 VDU 28,0,24,39,21
   80 :
   90 code%=&6000
  100 osbyte=&FFF4
  110 oswrch=&FFEE
  120 osasci=&FFE3
  130 :
  140 vdust=&D0
  150 oldes=&275
  160 :
  170 mode=&355
  180 tcx=&318
  190 tcy=&319
  200 csp=&F6
  210 :
  220 PROCass
  230 PROCcheck
  240 PRINT "Press a key
to save 'cut'"
  250 IF GET
  260 OSCLI "SAVE cut 60
00 "+STR$~O%+" 8000 8000
"
```

Continued ▶

◀ Cut & Paste continued

```
  270 END
  280 :
  290 DEF PROCass
  300 FOR X%=4 TO 6 STEP
 2
  310 P%=&8000
  320 O%=code%
  330 [OPT X%
  340 .romstrt
  350 EQUB 0
  360 EQUW 0
  370 JMP service
  380 EQUB &82
  390 EQUB (copyr-romstr
t)
  400 EQUB 0
  410 .message
  420 EQUB 13
  430 EQUS "Cut and Past
e"
  440 EQUB 13
  450 EQUB 0
  460 .copyr
  470 EQUB 0
  480 EQUS "(C) 1988 Bri
an Ross"
  490 EQUB 0
  500 :
  510 .service
  520 PHA
  530 STA temp
  540 TXA
  550 PHA
  560 TYA
  570 PHA
  580 LDA temp
  590 CMP #&15
  600 BEQ poll
  610 CMP #&09
  620 BEQ help
  630 CMP #&01
  640 BEQ init
  650 .exit
  660 .anrts
  670 PLA
  680 TAY
  690 PLA
  700 TAX
  710 PLA
  720 RTS
  730 :
  740 .poll
  750 JMP (pollvector)
  760 :
  770 .help
  780 LDA (&F2),Y
  790 CMP #13
  800 BNE helpout
  810 LDY #0
  820 .hloop
  830 LDA message,Y
  840 BEQ helpout
  850 JSR osasci
  860 INY
  870 JMP hloop
  880 .helpout
  890 JMP exit
  900 :
  910 .init
  920 LDA #22
  930 LDX #1
  940 JSR osbyte
  950 LDA #poll1 MOD 256
  960 STA pollvector
  970 LDA #poll1 DIV 256
  980 STA pollvector+1
  990 LDA #0
 1000 STA cflag
 1010 JMP exit
 1020 :
 1030 .poll1
 1040 LDA #129
 1050 LDX #&FF
 1060 LDY #&FF
 1070 JSR osbyte
 1080 BCC return
 1090 LDA #129
 1100 LDX #&FE
 1110 LDY #&FF
 1120 JSR osbyte
 1130 BCC return
 1140 LDA #129
 1150 LDX #&AC
 1160 LDY #&FF
 1170 JSR osbyte
 1180 BCS cutout
 1190 LDA #129
 1200 LDX #&AB
 1210 LDY #&FF
 1220 JSR osbyte
 1230 BCS pasteout
 1240 .return
 1250 JMP exit
 1260 :
 1270 .pasteout
 1280 JMP pasteout1
 1290 :
 1300 .cutout
 1310 LDA cflag
 1320 BEQ cut
 1330 JMP exit
 1340 .cut
 1350 LDA pollvector
 1360 STA ststatus
 1370 LDA pollvector+1
 1380 STA ststatus+1
 1390 LDA #anrts MOD 256
 1400 STA pollvector
 1410 LDA #anrts DIV 256
 1420 STA pollvector+1
 1430 JSR savexy
 1440 JSR savewindows
 1450 LDA #26
 1460 JSR oswrch
 1470 LDA #cbuff MOD 256
 1480 STA csp
 1490 LDA #cbuff DIV 256
 1500 STA csp+1
 1510 JSR sc_size
 1520 LDY nxc
 1530 DEY
 1540 STY maxx
 1550 LDY nyc
 1560 DEY
 1570 STY maxy
 1580 LDA #0
 1590 STA minx
 1600 STA miny
 1610 STA xpos
 1620 STA ypos
 1630 LDA #ASC"*"
 1640 STA prc
 1650 JSR move_cur
 1660 LDA #31
 1670 JSR oswrch
 1680 LDA xpos
 1690 STA minx
 1700 STA ulx
 1710 JSR oswrch
 1720 LDA ypos
 1730 STA miny
 1740 STA uly
 1750 JSR oswrch
 1760 LDA #135
 1770 JSR osbyte
 1780 STX ulc
 1790 LDA #ASC"#"
 1800 JSR oswrch
 1810 JSR move_cur
 1820 LDA xpos
 1830 STA lrx
 1840 LDA ypos
 1850 STA lry
 1860 INC lrx
 1870 INC lry
 1880 LDA #31
 1890 JSR oswrch
 1900 LDA ulx
 1910 JSR oswrch
 1920 LDA uly
 1930 JSR oswrch
 1940 LDA ulc
 1950 JSR oswrch
 1960 LDA uly
 1970 STA cuty
 1980 .cutl1
 1990 LDA ulx
 2000 STA cutx
 2010 .cutl2
 2020 LDA #31
 2030 JSR oswrch
 2040 LDA cutx
 2050 JSR oswrch
 2060 LDA cuty
 2070 JSR oswrch
 2080 LDA #135
 2090 JSR osbyte
 2100 CPX #&80
 2110 BCC notudc
 2120 LDX #32
 2130 .notudc
 2140 TXA
 2150 JSR cutstore
 2160 INC cutx
 2170 LDA cutx
 2180 CMP lrx
 2190 BNE cutl2
 2200 JSR cutel
 2210 INC cuty
 2220 LDA cuty
 2230 CMP lry
 2240 BNE cutl1
 2250 JSR cutet
 2260 LDA #1
 2270 STA cflag
 2280 JSR getwindows
 2290 JSR getxy
 2300 LDA ststatus
 2310 STA pollvector
 2320 LDA ststatus+1
 2330 STA pollvector+1
 2340 JMP exit
 2350 :
 2360 .cutstore
 2370 LDY #0
 2380 STA (csp),Y
 2390 INC csp
 2400 BEQ csover
 2410 RTS
```

Continued ▶

◀ Cut & Paste continued

```
2420 .csover
2430 INC csp+1
2440 RTS
2450 :
2460 .cutel
2470 SEC
2480 LDA csp
2490 SBC #1
2500 STA csp
2510 LDA csp+1
2520 SBC #0
2530 STA csp+1
2540 TXA
2550 ORA #&80
2560 JSR cutstore
2570 RTS
2580 .cutet
2590 LDA #&FF
2600 JSR cutstore
2610 RTS
2620 :
2630 .move_cur
2640 LDA oldes
2650 STA oldess
2660 LDA #1
2670 STA oldes
2680 LDA #31
2690 JSR oswrch
2700 LDA xpos
2710 JSR oswrch
2720 LDA ypos
2730 JSR oswrch
2740 LDA #135
2750 JSR osbyte
2760 STX oldchar
2770 LDA prc
2780 JSR oswrch
2790 LDA xpos
2800 STA oldx
2810 LDA ypos
2820 STA oldy
2830 .mcloop
2840 LDY #30
2850 .rdkdel
2860 LDX #0
2870 .readkde
2880 NOP
2890 NOP
2900 NOP
2910 INX
2920 BNE readkde
2930 DEY
2940 BNE rdkdel
2950 LDA #15
2960 LDA #1
2970 JSR osbyte
2980 .readkl
2990 LDA #&7A
3000 JSR osbyte
3010 CPX #&FF
3020 BEQ readkl
3030 CPX #25
3040 BEQ left
3050 CPX #121
3060 BEQ right
3070 CPX #41
3080 BEQ down
3090 CPX #57
3100 BEQ up
3110 CPX #73
3120 BEQ rrr
3130 JMP mcloop
3140 .rrr
3150 JMP end
3160 .left
3170 LDA xpos
3180 CMP minx
3190 BEQ leover
3200 DEC xpos
3210 .leover
3220 JMP pr_char
3230 .right
3240 LDA xpos
3250 CMP maxx
3260 BEQ riover
3270 INC xpos
3280 .riover
3290 JMP pr_char
3300 .down
3310 LDA ypos
3320 CMP maxy
3330 BEQ doover
3340 INC ypos
3350 .doover
3360 JMP pr_char
3370 .up
3380 LDA ypos
3390 CMP miny
3400 BEQ upover
3410 DEC ypos
3420 .upover
3430 .pr_char
3440 LDA #0
3450 STA mpflag
3460 LDA oldx
3470 CMP xpos
3480 BEQ xsame
3490 LDA #0
3500 STA mpflag
3510 JMP prov
3520 .xsame
3530 LDA #1
3540 STA mpflag
3550 .checky
3560 LDA oldy
3570 CMP ypos
3580 BEQ ysame
3590 LDA #0
3600 STA mpflag
3610 JMP prov
3620 .ysame
3630 LDA #1
3640 STA mpflag
3650 .prov
3660 LDA mpflag
3670 BEQ prov2
3680 JMP mcloop
3690 .prov2
3700 LDA #31
3710 JSR oswrch
3720 LDA oldx
3730 JSR oswrch
3740 LDA oldy
3750 JSR oswrch
3760 LDA oldchar
3770 JSR oswrch
3780 LDA #31
3790 JSR oswrch
3800 LDA xpos
3810 JSR oswrch
3820 LDA ypos
3830 JSR oswrch
3840 LDA #135
3850 JSR osbyte
3860 STX oldchar
3870 LDA prc
3880 JSR oswrch
3890 LDA xpos
3900 STA oldx
3910 LDA ypos
3920 STA oldy
3930 JMP mcloop
3940 .end
3950 LDA #31
3960 JSR oswrch
3970 LDA oldx
3980 JSR oswrch
3990 LDA ypos
4000 JSR oswrch
4010 LDA oldchar
4020 JSR oswrch
4030 LDA oldess
4040 STA oldes
4050 LDY #128
4060 .dl2
4070 LDX #0
4080 .dl2a
4090 NOP
4100 NOP
4110 NOP
4120 INX
4130 BNE dl2a
4140 DEY
4150 BNE dl2
4160 RTS
4170 :
4180 .sc_size
4190 LDA mode
4200 AND #7
4210 TAY
4220 LDA xtable,Y
4230 STA nxc
4240 LDA ytable,Y
4250 STA nyc
4260 RTS
4270 :
4280 .xtable
4290 EQUB 80
4300 EQUB 40
4310 EQUB 20
4320 EQUB 80
4330 EQUB 40
4340 EQUB 20
4350 EQUB 40
4360 EQUB 40
4370 :
4380 .ytable
4390 EQUB 32
4400 EQUB 32
4410 EQUB 32
4420 EQUB 25
4430 EQUB 32
4440 EQUB 32
4450 EQUB 25
4460 EQUB 25
4470 :
4480 .nyc
4490 EQUB 0
4500 .nxc
4510 EQUB 0
4520 :
4530 .pasteout1
4540 LDA cflag
4550 CMP #1
4560 BEQ paste
4570 JMP return
4580 .paste
4590 LDA pollvector
4600 STA ststatus
```

Continued ▶

◀ Cut & Paste continued

```
4610 LDA pollvector+1
4620 STA ststatus+1
4630 LDA #vector MOD 25
6
4640 STA pollvector
4650 LDA #vector DIV 25
6
4660 STA pollvector+1
4670 LDA #cbuff MOD 256
4680 STA papo
4690 LDA #cbuff DIV 256
4700 STA papo+1
4710 JMP return
4720 :
4730 .vector
4740 LDA #&80
4750 LDY #&FF
4760 LDX #&FF
4770 JSR osbyte
4780 CPX #0
4790 BNE endpas
4800 JSR getpaste
4810 TXA
4820 CMP #&FF
4830 BEQ switchoff
4840 PHA
4850 AND #&7F
4860 JSR ikb
4870 PLA
4880 BPL endpas
4890 LDA #13
4900 JSR ikb
4910 .endpas
4920 JMP exit
4930 .switchoff
4940 LDA ststatus
4950 STA pollvector
4960 LDA ststatus+1
4970 STA pollvector+1
4980 LDA #0
4990 STA cflag
5000 LDA #&FF
5010 STA cbuff
5020 JMP endpas
5030 .getpaste
5040 LDA papo
5050 STA csp
5060 LDA papo+1
5070 STA csp+1
5080 LDY #0
5090 LDA (csp),Y
5100 TAX
5110 LDA papo
5120 CLC
5130 ADC #1
5140 STA papo
5150 LDA papo+1
5160 ADC #0
5170 STA papo+1
5180 RTS
5190 .ikb
5200 LDX #0
5210 TAY
5220 LDA #&8A
5230 JMP osbyte
5240 :
5250 .savexy
5260 LDA tcx
5270 STA tabx
5280 LDA tcy
5290 STA taby
5300 LDA vdust
5310 STA vduss
5320 ORA #2
5330 AND #&BF
5340 STA vdust
5350 RTS
5360 .getxy
5370 LDA #31
5380 JSR oswrch
5390 SEC
5400 LDA tabx
5410 SBC &308
5420 JSR oswrch
5430 SEC
5440 LDA taby
5450 SBC &30B
5460 JSR oswrch
5470 LDA tabx
5480 STA tcx
5490 LDA taby
5500 STA tcy
5510 LDA vduss
5520 STA vdust
5530 RTS
5540 .savewindows
5550 LDY #0
5560 .swloop
5570 LDA &300,Y
5580 STA swstore,Y
5590 INY
5600 CPY #&10
5610 BNE swloop
5620 RTS
5630 :
5640 .getwindows
5650 LDY #0
5660 LDA #24
5670 JSR oswrch
5680 .gwl1
5690 LDA swstore,Y
5700 JSR oswrch
5710 INY
5720 CPY #8
5730 BNE gwl1
5740 LDA #28
5750 JSR oswrch
5760 .gwl2
5770 LDA swstore,Y
5780 JSR oswrch
5790 INY
5800 CPY #&C
5810 BNE gwl2
5820 LDA #29
5830 JSR oswrch
5840 .gwl3
5850 LDA swstore,Y
5860 JSR oswrch
5870 INY
5880 CPY #&10
5890 BNE gwl3
5900 RTS
5910 :
5920 .swstore
5930 EQUD 0
5940 EQUD 0
5950 EQUD 0
5960 EQUD 0
5970 EQUD 0
5980 :
5990 .cutx
6000 EQUB 0
6010 .cuty
6020 EQUB 0
6030 .ulx
6040 EQUB 0
6050 .uly
6060 EQUB 0
6070 .ulc
6080 EQUB 0
6090 .lrx
6100 EQUB 0
6110 .lry
6120 EQUB 0
6130 .ststatus
6140 EQUW 0
6150 .cflag
6160 EQUB 0
6170 .tabx
6180 EQUB 0
6190 .taby
6200 EQUB 0
6210 .vduss
6220 EQUB 0
6230 .pollvector
6240 EQUW 0
6250 .xpos
6260 EQUB 0
6270 .ypos
6280 EQUB 0
6290 .oldx
6300 EQUB 0
6310 .oldy
6320 EQUB 0
6330 .maxx
6340 EQUB 0
6350 .minx
6360 EQUB 0
6370 .maxy
6380 EQUB 0
6390 .miny
6400 EQUB 0
6410 .prc
6420 EQUB 0
6430 .oldchar
6440 EQUB 0
6450 .mpflag
6460 EQUB 0
6470 .editsts
6480 EQUB 0
6490 .oldess
6500 EQUB 0
6510 .papo
6520 EQUW 0
6530 .temp
6540 EQUB 0
6550 .cbuff
6560 ]
6570 NEXT
6580 ENDPROC
6590 :
6600 DEF PROCcheck
6610 T%=0
6620 FOR X%=code% TO O%
6630 T%=T%+?X%
6640 NEXT
6650 IF T%<>&258D6 THEN
VDU 7:PRINT "Checksum e
rror - Please check list
ing":END
6660 ENDPROC
```

See Arc Agora page 46

Listing 1. Archiver

```
   10 REM Agora - listing 1
   20 REM Arc Archiver
   30 REM by Dave Acton
   40 REM for Archimedes only
   50 REM (c) BAU March 1989
   60 :
   70 MODE 12
   80 *ADFS
   90 DIM q% &100,w% &100,d% &100,code%
 &1000
  100 PROCass
  110 space%=((HIMEM-END)-&4000) DIV 2
  120 DIM inw% space%+8,outw% space%+8
  130 PRINT "BAU Archiver 1.0"
  140 VDU 28,0,31,79,2
  150 REPEAT
  160 CLOSE# 0
  170 VDU 7
  180 PRINT "[A] - archive object"
  190 PRINT "[R] - recover archived obje
ct"
  200 PRINT "[Q] - quit"
  210 PRINT '"Please select option"'
  220 REPEAT
  230 choice%=INSTR(" AaRrQq",GET$) DIV
 2
  240 UNTIL choice%>0
  250 IF choice%=1 PROCarchive
  260 IF choice%=2 PROCrecover
  270 UNTIL choice%=3
  280 VDU 26,12
  290 END
  300 :
  310 DEF PROCarchive
  320 sourcedir$=FNgetdir("Which object
do you wish to archive?","adfs::4.$")
  330 destdrive%=FNgetdrive("Archive to
which drive?",0)
  340 try%=FNyn("Try to compact data")
  350 t1$=TIME$
  360 t2$=MID$(t1$,5,2)+MID$(t1$,8,3)+MI
D$(t1$,14,2)
  370 disc%=1
  380 PRINT ''
  390 PROCprepout(destdrive%)
  400 TIME=0
  410 PROCdoobj(sourcedir$,0)
  420 PROCb(255)
  430 CLOSE# out%
  440 CLS
  450 PRINT "Object '"sourcedir$"' succe
ssfully archived."'
  460 ENDPROC
  470 :
  480 DEF PROCdoobj(o$,depth%)
  490 LOCAL type%
  500 SYS "OS_File",5,o$ TO type%
  510 IF type%=1 PROCdofile(o$)
  520 IF type%=2 PROCdodir(o$)
  530 ENDPROC
  540 :
  550 DEF PROCdofile(f$)
  560 LOCAL i%
  570 LOCAL ERROR
  580 ON ERROR LOCAL VDU 7:PRINT'"Can't
archive file '"f$"' ("REPORT$")":RESTORE
 ERROR:ENDPROC
  590 PRINTSPC(depth%)FNlastbit(f$)" ";
  600 SYS "OS_File",5,f$ TO ,,!w%,w%!4,w
%!8,w%!12
  610 PROCb(1)
  620 PROCs(FNlastbit(f$))
  630 PROCwriteblock(w%,16)
  640 in%=OPENIN(f$)
  650 compactable%=FALSE
  660 IF w%!8<space% AND try% THEN
  670 SYS "OS_GBPB",4,inw%,w%!8
  680 compactable%=FNcount(inw%,inw%+w%!
8,outw%,complen%)
  690 ENDIF
  700 IF compactable% THEN
  710 PRINT "(";INT(complen%/w%!8*100)"%
)"
  720 COLOUR 3
  730 COLOUR 7
  740 PROCb(1)
  750 !w%=complen%
  760 PROCwriteblock(w%,4)
  770 PROCwriteblock(outw%,complen%)
  780 ELSE
  790 PRINT
  800 PTR# in%=0
  810 PROCb(0)
  820 bytesleft%=w%!8
  830 WHILE bytesleft%>0
  840 IF remain%=0 CLOSE#out%:PROCprepou
t(destdrive%)
  850 chunk%=space%
  860 IF chunk%>bytesleft% chunk%=bytesl
eft%
  870 IF chunk%>remain% chunk%=remain%
  880 SYS "OS_GBPB",4,in%,inw%,chunk%
  890 SYS "OS_GBPB",2,out%,inw%,chunk%
  900 bytesleft%-=chunk%
  910 remain%-=chunk%
  920 ENDWHILE
  930 ENDIF
  940 CLOSE# in%
  950 RESTORE ERROR
  960 ENDPROC
  970 :
  980 DEF PROCwriteblock(base%,bytesleft
%)
  990 WHILE bytesleft%>0
 1000 IF remain%=0 CLOSE#out%:PROCprepou
t(destdrive%)
 1010 chunk%=space%
 1020 IF chunk%>bytesleft% chunk%=bytesl
eft%
 1030 IF chunk%>remain% chunk%=remain%
 1040 SYS "OS_GBPB",2,out%,base%,chunk%
 1050 base%+=chunk%
 1060 bytesleft%-=chunk%
 1070 remain%-=chunk%
 1080 ENDWHILE
 1090 ENDPROC
 1100 :
 1110 DEF PROCreadblock(base%,bytesleft%
)
 1120 WHILE bytesleft%>0
 1130 IF remain%=0 CLOSE#in%:PROCprepin(
sourcedrive%)
 1140 chunk%=space%
 1150 IF chunk%>bytesleft% chunk%=bytesl
eft%
 1160 IF chunk%>remain% chunk%=remain%
 1170 SYS "OS_GBPB",4,in%,base%,chunk%
 1180 base%+=chunk%
 1190 bytesleft%-=chunk%
 1200 remain%-=chunk%
 1210 ENDWHILE
 1220 ENDPROC
 1230 :
 1240 DEF PROCdodir(d$)
 1250 LOCAL n%,read%,i%
 1260 COLOUR 6
```

Continued ▶

◀ **Archiver continued**

```
1270 PRINT SPC(depth%)"Directory: "d$
1280 COLOUR 7
1290 PROCb(2)
1300 IF depth%=0 PROCs(d$) ELSE PROCs(F
Nlastbit(d$))
1310 n%=0
1320 SYS "OS_GBPB",9,d$,q%,1,n%,&100,"*
" TO ,,,read%,n%
1330 IF read%=0 THEN
1340 PRINT "(Directory "d$" is empty)"
1350 ELSE
1360 WHILE n%>=0
1370 i%=0
1380 WHILE i%?q%>0
1390 i%+=1
1400 ENDWHILE
1410 i%?q%=13
1420 PROCdoobj(d$+"."+$q%,depth%+1)
1430 SYS "OS_GBPB",9,d$,q%,1,n%,&100,"*
" TO ,,,,n%
1440 ENDWHILE
1450 ENDIF
1460 PROCb(3)
1470 ENDPROC
1480 :
1490 DEF FNgetdir(q$,def$)
1500 REPEAT
1510 PROCins(def$)
1520 PRINT q$;
1530 INPUT " "dir$
1540 WHILE ASC(dir$)=32
1550 dir$=MID$(dir$,2)
1560 ENDWHILE
1570 IF FNfiletype(dir$)=0 PRINT '"Sorr
y, that object does not exist"'
1580 UNTIL FNfiletype(dir$)=2
1590 =dir$
1600 :
1610 DEF FNgetdrive(q$,def%)
1620 PROCins(STR$(def%))
1630 PRINT q$;
1640 INPUT " "drive$
1650 WHILE ASC(drive$)=32
1660 dir$=MID$(drive$,2)
1670 ENDWHILE
1680 =VAL(drive$)
1690 :
1700 DEF FNfiletype(f$)
1710 LOCAL type%
1720 LOCAL ERROR
1730 ON ERROR LOCAL RESTORE ERROR:=0
1740 SYS "OS_File",5,f$ TO type%
1750 RESTORE ERROR
1760 =type%
1770 :
1780 DEF PROCprepout(destdrive%)
1790 REPEAT
1800 PROCprompt("Insert blank disc "+ST
R$(disc%)+" in drive "+STR$(destdrive%))
1810 ready%=FNreadyout(destdrive%)
1820 IF ready%>0 THEN
1830 IF ready%<>&108D3 THEN
1840 PRINT"Format disc - ";
1850 SYS "OS_CLI","FORMAT "+STR$(destdr
ive%)+" D"
1860 ready%=FNreadyout(destdrive%)
1870 ENDIF
1880 ENDIF
1890 UNTIL ready%=TRUE
1900 SYS "ADFS_FreeSpace",":"+STR$(dest
drive%) TO remain%,freeblock%
1910 out%=OPENOUT("ADFS::"+STR$(destdri
ve%)+".$.Backup")
1920 SYS "OS_CLI","NameDisc :"+STR$(des
tdrive%)+" "+t2$+"/"+STR$(disc%)
1930 PROCs(t1$+"/"+STR$(disc%))
1940 disc%+=1
1950 ENDPROC
1960 :
1970 DEF PROCprepin(sourcedrive%)
1980 REPEAT
1990 REPEAT
2000 PROCprompt("Insert archive disc "+
STR$(disc%)+" in drive "+STR$(sourcedriv
e%))
2010 UNTIL FNreadyin(sourcedrive%)=TRUE
2020 remain%=EXT#in%
2030 ch$=FNs
2040 IF disc%=1 t1$=ch$
2050 UNTIL LEFT$(ch$,24)=LEFT$(t1$,24)
AND VAL(MID$(ch$,26))=disc%
2060 disc%+=1
2070 ENDPROC
2080 :
2090 DEF PROCprompt(p$)
2100 LOCAL y%
2110 y%=VPOS
2120 COLOUR 132
2130 PRINT p$;" and press RETURN";
2140 COLOUR 128
2150 VDU 7
2160 *FX 15
2170 REPEAT
2180 UNTIL GET=13
2190 PRINTTAB(0,y%)SPC(79)TAB(0,y%);
2200 ENDPROC
2210 :
2220 DEF FNreadyout(drive%)
2230 LOCAL ERROR
2240 ON ERROR LOCAL RESTORE ERROR:PROCr
eport:=ERR
2250 SYS "OS_CLI","-ADFS-MOUNT "+STR$(d
rive%)
2260 SYS "OS_GBPB",9,"ADFS::"+STR$(driv
e%)+".$",q%,1,0,&100,"*" TO ,,,obj%
2270 IF obj%>0 THEN
2280 IF FNyn("Disc is not blank - erase
 contents") SYS "OS_CLI","Wipe ADFS::"+S
TR$(drive%)+".$.* RF~C~V"
2290 ENDIF
2300 SYS "OS_GBPB",9,"ADFS::"+STR$(driv
e%)+".$",q%,1,0,&100,"*" TO ,,,obj%
2310 RESTORE ERROR
2320 =(obj%=0)
2330 :
2340 DEF FNyn(q$)
2350 LOCAL yn%
2360 PRINT q$"? (Y/N) ";
2370 REPEAT
2380 yn%=INSTR(" YyNn",GET$) DIV 2
2390 UNTIL yn%>0
2400 IF yn%=1 PRINT "Yes" ELSE PRINT "N
o"
2410 =(yn%=1)
2420 :
2430 DEF FNreadyin(drive%)
2440 LOCAL ERROR
2450 ON ERROR LOCAL RESTORE ERROR:PROCr
eport:=ERR
2460 SYS "OS_CLI","-ADFS-MOUNT "+STR$(d
rive%)
2470 in%=OPENIN("ADFS::"+STR$(sourcedri
ve%)+".$.Backup")
2480 RESTORE ERROR
2490 =(in%>0)
2500 :
```

Continued ▶

YELLOW PAGES

ARC AGORA

◀ Archiver continued

```
 2510 DEF PROCs($d%)
 2520 PROCwriteblock(d%,LEN($d%)+1)
 2530 ENDPROC
 2540 :
 2550 DEF PROCb(?d%)
 2560 PROCwriteblock(d%,1)
 2570 ENDPROC
 2580 :
 2590 DEF FNlastbit(f$)
 2600 LOCAL i%
 2610 i%=LEN(f$)+1
 2620 REPEAT
 2630 i%-=1
 2640 UNTIL i%=0 OR MID$(f$,i%,1)="."
 2650 =MID$(f$,i%+1)
 2660 :
 2670 DEF PROCass
 2680 literal%=141:comped%=142:mini%=143
 2690 start=0:end=1:dest=2:destend=3
 2700 read=4:byte=5:compaddr=6:longest=7
 2710 byte2=8:read2=9:compaddr2=10:besta
ddr=11
 2720 word=12:sp=13:link=14:pc=15
 2730 FOR pass%=0 TO 2 STEP 2
 2740 P%=code%
 2750 [OPT pass%
 2760 .comp
 2770 STMFD (sp)!,{dest}
 2780 SUB destend,end,start
 2790 ADD destend,dest,destend
 2800 MOV read,start
 2810 .countloop
 2820 CMP dest,destend
 2830 BGT finishedcomp
 2840 CMP read,end
 2850 BGE finishedcomp
 2860 MOV longest,#0
 2870 SUB compaddr,read,#255
 2880 CMP compaddr,start
 2890 MOVLT compaddr,start
 2900 .compareloop1
 2910 LDRB byte,[read]
 2920 .findfirst
 2930 TST compaddr,#%11
 2940 BEQ words
 2950 LDRB byte2,[compaddr],#1
 2960 CMP byte,byte2
 2970 BNE findfirst
 2980 B gotfirst
 2990 .words
 3000 LDR word,[compaddr],#1
 3010 AND byte2,word,#255
 3020 CMP byte,byte2
 3030 BEQ gotfirst
 3040 MOV word,word,LSR #8
 3050 ADD compaddr,compaddr,#1
 3060 AND byte2,word,#255
 3070 CMP byte,byte2
 3080 BEQ gotfirst
 3090 MOV word,word,LSR #8
 3100 ADD compaddr,compaddr,#1
 3110 AND byte2,word,#255
 3120 CMP byte,byte2
 3130 BEQ gotfirst
 3140 ADD compaddr,compaddr,#1
 3150 CMP byte,word,LSR #8
 3160 BNE words
 3170 .gotfirst
 3180 CMP compaddr,read
 3190 BGE donecomp
 3200 MOV compaddr2,compaddr
 3210 ADD read2,read,#1
 3220 .compareloop2
 3230 CMP read2,end
 3240 BGE notsame
 3250 CMP compaddr2,read
 3260 BGE notsame
 3270 LDRB byte,[read2],#1
 3280 LDRB byte2,[compaddr2],#1
 3290 CMP byte,byte2
 3300 BEQ compareloop2
 3310 .notsame
 3320 SUB read2,read2,read
 3330 SUB read2,read2,#1
 3340 CMP read2,longest
 3350 MOVGT longest,read2
 3360 SUBGT bestaddr,compaddr,#1
 3370 B compareloop1
 3380 .donecomp
 3390 SUBS longest,longest,#3
 3400 BMI nohope
 3410 SUB byte,read,bestaddr
 3420 CMP byte,#32
 3430 BGE notmini
 3440 CMP longest,#8
 3450 BGE notmini
 3460 MOV byte2,#mini%
 3470 STRB byte2,[dest],#1
 3480 ADD byte2,longest,byte,ASL #3
 3490 STRB byte2,[dest],#1
 3500 B nextread
 3510 .notmini
 3520 CMP longest,#0
 3530 BEQ nohope
 3540 MOV byte2,#comped%
 3550 STRB byte2,[dest],#1
 3560 STRB byte,[dest],#1
 3570 STRB longest,[dest],#1
 3580 .nextread
 3590 ADD read,read,longest
 3600 ADD read,read,#3
 3610 B countloop
 3620 .nohope
 3630 LDRB byte,[read],#1
 3640 CMP byte,#literal%
 3650 CMPNE byte,#comped%
 3660 CMPNE byte,#mini%
 3670 BNE notspec
 3680 MOV byte2,#literal%
 3690 STRB byte2,[dest],#1
 3700 .notspec
 3710 STRB byte,[dest],#1
 3720 B countloop
 3730 .finishedcomp
 3740 LDMFD (sp)!,{byte}
 3750 SUB R0,dest,byte
 3760 MOV pc,link
 3770 :
 3780 .expand
 3790 CMP start,end
 3800 MOVGE pc,link
 3810 LDRB byte,[dest],#1
 3820 CMP byte,#literal%
 3830 BNE notliteral
 3840 LDRB byte,[dest],#1
 3850 .ordinary
 3860 STRB byte,[start],#1
 3870 B expand
 3880 .notliteral
 3890 CMP byte,#comped%
 3900 BNE notcomped
 3910 LDRB read2,[dest],#1
 3920 LDRB longest,[dest],#1
 3930 B wascomped
 3940 .notcomped
 3950 CMP byte,#mini%
```

Continued ▶

◀ **Archiver continued**

```
3960 BNE ordinary
3970 LDRB byte,[dest],#1
3980 AND longest,byte,#%111
3990 MOV read2,byte,LSR #3
4000 .wascomped
4010 SUB compaddr,start,read2
4020 ADD longest,longest,#3
4030 .copy
4040 LDRB byte,[compaddr],#1
4050 STRB byte,[start],#1
4060 SUBS longest,longest,#1
4070 BNE copy
4080 B expand
4090 ]:NEXT pass%
4100 ENDPROC
4110 :
4120 DEF FNcount(A%,B%,C%,RETURN comple
n%)
4130 complen%=USR(comp)
4140 =(complen%<w%!8)
4150 :
4160 DEF PROCrecover
4170 LOCAL ERROR
4180 ON ERROR LOCAL RESTORE ERROR:CLS:P
ROCreport:ENDPROC
4190 disc%=1
4200 sourcedrive%=FNgetdrive("Recover f
rom which drive?",0)
4210 PROCprepin(sourcedrive%)
4220 PRINT "Object was archived on: "t1
$
4230 dummy%=FNb
4240 topdir$=FNs
4250 dir$=FNgetdir("Restore to where?",
topdir$)
4260 PRINT''
4270 depth%=0
4280 REPEAT
4290 type%=FNb
4300 CASE type% OF
4310 WHEN 1:
4320 f$=dir$+"."+FNs
4330 load%=FNw
4340 exec%=FNw
4350 len%=FNw
4360 attrib%=FNw
4370 COLOUR 7
4380 PRINT SPC(depth%)FNlastbit(f$);" "
4390 compacted%=(FNb=1)
4400 IF compacted% THEN
4410 IF len%>space% ERROR 17,"Insuffici
ent workspace to recover '"+f$+"'"
4420 complen%=FNw
4430 PROCreadblock(inw%,complen%)
4440 A%=outw%
4450 B%=outw%+len%
4460 C%=inw%
4470 CALL expand
4480 SYS "OS_File",0,f$,,,outw%,outw%+l
en%
4490 ELSE
4500 out%=OPENOUT(f$)
4510 bytesleft%=len%
4520 WHILE bytesleft%>0
4530 IF remain%=0 CLOSE# in%:PROCprepin
(sourcedrive%)
4540 chunk%=space%
4550 IF chunk%>bytesleft% chunk%=bytesl
eft%
4560 IF chunk%>remain% chunk%=remain%
4570 SYS "OS_GBPB",4,in%,outw%,chunk%
4580 SYS "OS_GBPB",2,out%,outw%,chunk%
4590 bytesleft%-=chunk%
4600 remain%-=chunk%
4610 ENDWHILE
4620 CLOSE# out%
4630 ENDIF
4640 SYS "OS_File",1,f$,load%,exec%,,at
trib%
4650 WHEN 2:
4660 dir$=dir$+"."+FNs
4670 COLOUR 6
4680 PRINT SPC(depth%)"Directory: "FNla
stbit(dir$)
4690 SYS "OS_CLI","CDIR "+dir$
4700 SYS "OS_CLI","DIR "+dir$
4710 depth%+=1
4720 WHEN 3:
4730 *UP
4740 dir$=FNfirstbit(dir$)
4750 depth%-=1
4760 ENDCASE
4770 UNTIL type%=255
4780 CLOSE# in%
4790 CLS
4800 PRINT "Object '"topdir$"' successf
ully recovered."'
4810 RESTORE ERROR
4820 ENDPROC
4830 :
4840 DEF FNs
4850 LOCAL i%,s$,n%
4860 s$=""
4870 REPEAT
4880 n%=FNb
4890 IF n%<>13 s$=s$+CHR$(n%)
4900 UNTIL n%=13
4910 =s$
4920 :
4930 DEF FNfirstbit(f$)
4940 LOCAL i%
4950 i%=LEN(f$)+1
4960 REPEAT
4970 i%-=1
4980 UNTIL i%=0 OR MID$(f$,i%,1)="."
4990 =LEFT$(f$,i%-1)
5000 :
5010 DEF FNw
5020 LOCAL i%
5030 FOR i%=0 TO 3
5040 i%?w%=FNb
5050 NEXT
5060 =!w%
5070 :
5080 DEF FNb
5090 IF remain%=0 CLOSE# in%:PROCprepin
(sourcedrive%)
5100 remain%-=1
5110 =BGET# in%
5120 :
5130 DEF PROCreport
5140 COLOUR 1
5150 PRINT '"ERROR: "REPORT$''
5160 COLOUR 7
5170 ENDPROC
5180 :
5190 DEF PROCins(s$)
5200 LOCAL i%
5210 FOR i%=1 TO LEN(s$)
5220 SYS "OS_Byte",138,0,ASC(MID$(s$,i%
))
5230 NEXT
5240 ENDPROC
```

SIDEWAYS RAM

Listing 2. Pathname

```
   10 REM Agora - listin
g 2
   20 REM Pathname finde
r
   30 REM by Dave Lawren
ce
   40 REM for Archimedes
 only
   50 REM (c) BAU March
1989
   60 :
   70 byte=0:to=1:from=2
:len=4
   80 space=11:num=12
   90 sp=13:link=14:pc=1
5
  100 DIM code% 1000
  110 FOR pass%=4 TO 6 S
TEP 2
  120 P%=0:O%=code%
  130 [OPT pass%
  140 EQUD 0
  150 EQUD 0
  160 EQUD 0
  170 EQUD 0
  180 EQUD titlestring
  190 EQUD helpstring
  200 EQUD helptable
  210 EQUD 0
  220 EQUD 0
  230 EQUD 0
  240 EQUD 0
  250 :
  260 .titlestring
  270 EQUS "BroomCupboar
d"
  280 EQUB 0
  290 :
  300 .helpstring
  310 EQUS "BroomCupboar
d"
  320 EQUB 9
  330 EQUS "1.00 ("
  340 EQUS MID$(TIME$,5,
11)
  350 EQUS ")"
  360 EQUB 0
  370 :
  380 .helptable
  390 EQUS "PathName"
  400 EQUB 0
  410 ALIGN
  420 EQUD path
  430 EQUD &00010100
  440 EQUD pathsyn
  450 EQUD pathhelp
  460 :
  470 EQUB 0
  480 :
  490 .pathhelp
  500 EQUS "*PathName sh
ows the full pathname of
 the currently selected
(or specified) directory
."
  510 EQUB 13
  520 .pathsyn
  530 EQUS "Syntax: *Pat
hName [<dir>]"
  540 EQUB 0
  550 ALIGN
  560 :
  570 .path
  580 STMFD (sp)!,{link}
  590 MOV space,R0
  600 MOV num,R1
  610 MOV R0,#6
  620 MOV R3,#&200
  630 SWI "OS_Module"
  640 BVC gotsome
  650 ADR R0,panic
  660 LDMFD (sp)!,{pc}
  670 .panic
  680 EQUD 17
  690 EQUS "Couldn't cla
im workspace"
  700 EQUB 0
  710 ALIGN
  720 .gotsome
  730 CMP num,#0
  740 BEQ nodir
  750 MOV R0,#0
  760 MOV R1,space
  770 SWI "XOS_FSControl
"
  780 BVS return
  790 .nodir
  800 MOV space,from
  810 MOV num,#0
  820 .repeat
  830 MOV byte,#6
  840 SWI "OS_GBPB"
  850 LDRB len,[from,#1]
!
  860 BL copy
  870 CMP byte,#ASC"$"
  880 MOV byte,#ASC"."
  890 STMFD (sp)!,{byte}
  900 ADD num,num,#1
  910 BEQ end
  920 ADR R0,up
  930 SWI "OS_CLI"
  940 B repeat
  950 .end
  960 MOV byte,#5
  970 SWI "OS_GBPB"
  980 LDRB len,[from]
  990 BL copy
 1000 MOV byte,#ASC":"
 1010 STMFD (sp)!,{byte}
 1020 ADD num,num,#1
 1030 MOV to,space
 1040 .pullover
 1050 LDMFD (sp)!,{byte}
 1060 STRB byte,[to],#1
 1070 SWI "OS_WriteC"
 1080 SUBS num,num,#1
 1090 BNE pullover
 1100 SWI "OS_NewLine"
 1110 MOV byte,#13
 1120 STRB byte,[to],#1
 1130 MOV R0,#0
 1140 MOV R1,space
 1150 SWI "OS_FSControl"
 1160 .return
 1170 MOV byte,#7
 1180 MOV R2,space
 1190 SWI "OS_Module"
 1200 LDMFD (sp)!,{pc}
 1210 :
 1220 .copy
 1230 CMP len,#0
 1240 BNE oktocopy
 1250 STMFD (sp)!,{R1-R2
,link}
 1260 SWI "ADFS_Drives"
 1270 LDMFD (sp)!,{R1-R2
,link}
 1280 ADD R0,R0,#48
 1290 STMFD (sp)!,{byte}
 1300 ADD num,num,#1
 1310 MOV pc,link
 1320 .oktocopy
 1330 ADD from,from,len
 1340 .copyname
 1350 LDRB byte,[from],#
-1
 1360 STMFD (sp)!,{byte}
 1370 ADD num,num,#1
 1380 SUBS len,len,#1
 1390 CMP len,#1
 1400 BGE copyname
 1410 MOV pc,link
 1420 :
 1430 .up
 1440 EQUS "UP"
 1450 EQUB 13
 1460 ]:NEXT pass%
 1470 OSCLI("Save Cupboa
rd "+STR$~code%+" "+STR$
~O%)
 1480 *SetType Cupboard
FFA
 1490 PRINT"Current path
name is: ";
 1500 *RMLoad Cupboard
 1510 *PathName
 1520 END
```

See Hit & RAM, page 66

```
   10 REM Basic/Wordwise
-Plus Swap
   20 REM by David Harpe
r
   30 REM for BBC B/B+/M
/C with SW RAM, Basic II
 (and Wordwise-Plus)
   40 REM (c) BAU March
1989
   50 :
   60 addr=&B0
   70 fileadd=&B2:buffad
d=&B4
   80 :
   90 DATA 82
  100 DATA BASIC / WORDW
ISE-PLUS Swap
  110 DATA 0
  120 DATA 14th July 198
8
  130 DATA 1,SWAP,swap
  140 DATA 2
  150 DATA 1,break,6,ise
rror
  160 DATA 5
  170 DATA E,newwrchv,10
,newrdchv
```

Continued ▶

◀ Hit & RAM continued

```
  180 DATA 12,newfilev,1
4,newargsv
  190 DATA 1C,newfindv
  200 DATA 500,SWAP
  210 :
  220 READ type$:type%=E
VAL("&"+type$)
  230 READ title$,versio
n%,copyrt$
  240 READ numkeywds%
  250 IF numkeywds%>0:PR
OCreadkw
  260 READ numsc%
  270 IF numsc%>0:PROCre
adsc
  280 READ numvects%
  290 IF numvects%>0:PRO
Creadxv
  300 READ cdsize$
  310 cdsize%=EVAL("&"+c
dsize$)
  320 READ filename$
  330 :
  340 DIM code% cdsize%
  350 zp=&A8
  360 osbyte=&FFF4
  370 oswrch=&FFEE:osnew
l=&FFE7
  380 FOR pass%=4 TO 6 S
TEP 2
  390 PROCassemble
  400 NEXT
  410 PRINT "code locati
on:"
  420 PRINT "         ";~c
ode%;"    ";~O%
  430 PRINT "File size =
 &";
  440 PRINT ;~O%-code%;"
 bytes"
  450 PRINT '"Save machi
ne code? (Y/N) ";
  460 REPEAT
  470 A$=GET$
  480 UNTIL INSTR("NnYy"
,A$)>0
  490 PRINT A$
  500 IF INSTR("Yy",A$)>
0:PROCsave
  510 END
  520 :
  530 DEF PROCsave
  540 OSCLI("SAVE "+file
name$+" "+STR$~code%+CHR
$32+STR$~O%+" 0 8000")
  550 ENDPROC
  560 :
  570 DEF PROCreadkw
  580 DIM keywd$(numkeyw
ds%)
  590 DIM actnadd$(numke
ywds%)
  600 FOR N%=1 TO numkey
wds%
  610 READ keywd$(N%),ac
tnadd$(N%)
  620 NEXT
  630 ENDPROC
  640 :
  650 DEF PROCreadsc
  660 DIM servcalls%(num
sc%)
  670 DIM servadd$(numsc
%)
  680 FOR N%=1 TO numsc%
  690 READ servcalls$,se
rvadd$(N%)
  700 servcalls%(N%)=EVA
L("&"+servcalls$)
  710 NEXT
  720 ENDPROC
  730 :
  740 DEF PROCreadxv
  750 DIM pg2loc%(numvec
ts%)
  760 DIM vectadd$(numve
cts%)
  770 FOR N%=1 TO numvec
ts%
  780 READ pg2loc$
  790 pg2loc%(N%)=EVAL("
&"+pg2loc$)
  800 READ vectadd$(N%)
  810 NEXT
  820 ENDPROC
  830 :
  840 DEF PROCkwcode
  850 [OPT pass%
  860 CMP #4
  870 BEQ P%+5
  880 JMP other
  890 JSR recog
  900 TAX
  910 BPL P%+5
  920 JMP regain
  930 ASL A
  940 TAX
  950 LDA actntable,X
  960 STA doactn+1
  970 LDA actntable+1,X
  980 STA doactn+2
  990 .doactn
 1000 JSR &FFFF
 1010 TSX
 1020 LDA #0
 1030 STA &103,X
 1040 JMP regain
 1050 :
 1060 .recog
 1070 LDA #0
 1080 STA recflag
 1090 TYA
 1100 CLC
 1110 ADC &F2
 1120 STA command+1
 1130 LDA &F3
 1140 ADC #0
 1150 STA command+2
 1160 LDA #keywds MOD 25
6
 1170 STA compare+1
 1180 LDA #keywds DIV 25
6
 1190 STA compare+2
 1200 .reclp
 1210 LDX #0
 1220 .compare
 1230 LDA &FFFF,X
 1240 BMI unrecogd
 1250 BEQ match
 1260 STA temp
 1270 .command
 1280 LDA &FFFF,X
 1290 CMP #ASC"."
 1300 BEQ match
 1310 AND #&DF
 1320 CMP temp
 1330 BNE nomatch
 1340 INX
 1350 BNE compare
 1360 .match
 1370 LDA recflag
 1380 RTS
 1390 .unrecogd
 1400 LDA #&FF
 1410 RTS
 1420 .nomatch
 1430 INC recflag
 1440 LDA compare+1
 1450 STA compon+1
 1460 LDA compare+2
 1470 STA compon+2
 1480 .compon
 1490 LDA &FFFF,X
 1500 BEQ endword
 1510 INX
 1520 BNE compon
 1530 .endword
 1540 SEC
 1550 TXA
 1560 ADC compare+1
 1570 STA compare+1
 1580 BCC reclp
 1590 INC compare+2
 1600 BCS reclp
 1610 .recflag
 1620 EQUB 0
 1630 ]
 1640 keywds=P%
 1650 FOR N%=1 TO numkey
wds%
 1660 KW$=keywd$(N%)
 1670 $O%=KW$
 1680 O%=O%+LENKW$+1:P%=
P%+LENKW$+1
 1690 ?(O%-1)=0
 1700 NEXT
 1710 ?O%=&FF:O%=O%+1:P%
=P%+1
 1720 actntable=P%
 1730 P%=P%+numkeywds%*2
 1740 FOR N%=1 TO numkey
wds%
 1750 IF pass% AND 2:!O%
=EVAL(actnadd$(N%))
 1760 O%=O%+2
 1770 NEXT
 1780 ENDPROC
 1790 :
 1800 DEF PROCclaimcode
 1810 [OPT pass%
 1820 .claim
 1830 LDA #&FF
 1840 STA clflag
 1850 BMI clmunclm
 1860 :
 1870 .unclaim
 1880 LDA #0
 1890 STA clflag
 1900 :
 1910 .clmunclm
 1920 LDA #&A8
 1930 LDX #0
 1940 LDY #&FF
 1950 JSR osbyte
 1960 STX zp
 1970 STY zp+1
 1980 LDA #numvects%-1
 1990 STA vectno
```

Continued ▶

◀ Hit & RAM continued

```
2000 .claimlp
2010 LDX vectno
2020 LDY pg2offsets,X
2030 TXA
2040 ASL A
2050 TAX
2060 JSR transfer2
2070 INX
2080 INY
2090 JSR transfer2
2100 LDX vectno
2110 LDY pgdoffsets,X
2120 TXA
2130 ASL A
2140 ADC vectno
2150 TAX
2160 LDA #0
2170 STA putslotflag
2180 JSR transferd
2190 INY
2200 INX
2210 JSR transferd
2220 INY
2230 INX
2240 DEC putslotflag
2250 JSR transferd
2260 DEC vectno
2270 BPL claimlp
2280 RTS
2290 .clflag
2300 EQUB 0
2310 .vectno
2320 EQUB 0
2330 .putslotflag
2340 EQUB 0
2350 :
2360 .transfer2
2370 BIT clflag
2380 BPL uncl2
2390 LDA &200,Y
2400 STA oldvects,X
2410 TYA
2420 BIT one
2430 BEQ evenY
2440 LDA #&FF
2450 BMI storbyte
2460 .evenY
2470 STA temp
2480 LSR A
2490 ADC temp
2500 .storbyte
2510 STA &200,Y
2520 RTS
2530 .uncl2
2540 LDA oldvects,X
2550 STA &200,Y
2560 RTS
2570 .one
2580 EQUB 1
2590 :
2600 .transferd
2610 BIT clflag
2620 BPL uncld
2630 LDA (zp),Y
2640 STA oldxvects,X
2650 LDA NewVects,X
2660 BIT putslotflag
2670 BPL P%+5
2680 LDA ThisSlot
2690 STA (zp),Y
2700 RTS
2710 .uncld
2720 LDA oldxvects,X
2730 STA (zp),Y
2740 RTS
2750 :
2760 ]
2770 pg2offsets=P%
2780 pgdoffsets=P%+numv
ects%
2790 NewVects=P%+numvec
ts%*2
2800 oldvects=P%+numvec
ts%*5
2810 oldxvects=P%+numve
cts%*7
2820 P%=P%+numvects%*10
2830 FOR N%=1 TO numvec
ts%
2840 ?O%=pg2loc%(N%):O%
=O%+1
2850 NEXT
2860 FOR N%=1 TO numvec
ts%
2870 ?O%=(pg2loc%(N%)DI
V2)*3:O%=O%+1
2880 NEXT
2890 FOR N%=1 TO numvec
ts%
2900 IF pass% AND 2:!O%
=EVAL(vectadd$(N%))
2910 O%=O%+3
2920 NEXT
2930 O%=O%+numvects%*5
2940 ENDPROC
2950 :
2960 DEF PROCServcode
2970 FOR N%=1 TO numsc%
2980 [OPT pass%
2990 CMP #servcalls%(N%
)
3000 BNE P%+8
3010 ]
3020 IF pass% AND 2:[OP
T pass%:JSR EVALservadd$
(N%):]:ELSE:P%=P%+3:O%=O
%+3
3030 [OPT pass%
3040 JMP regain
3050 ]
3060 NEXT
3070 ENDPROC
3080 :
3090 DEF PROCassemble
3100 P%=&8000:O%=code%
3110 :
3120 [OPT pass%
3130 EQUW 0:EQUB 0
3140    \or "JMP Languag
e" if type%=&C2
3150 JMP Service
3160 EQUB type%
3170 EQUB copyrt-&8000
3180 EQUB version%
3190 .title
3200 EQUS title$
3210 .copyrt
3220 EQUB 0
3230 EQUS "(C) "+copyrt
$
3240 EQUB 0
3250 :
3260 .Service
3270 STX ThisSlot
3280 PHA
3290 TXA
3300 PHA
3310 TYA
3320 PHA
3330 TSX
3340 LDA &103,X
3350 CMP #9
3360 BNE NotHelp
3370 LDA (&F2),Y
3380 CMP #&D
3390 BNE regain
3400 JSR osnewl
3410 LDX #0
3420 .Prtlp
3430 LDA title,X
3440 BEQ Prted
3450 JSR oswrch
3460 INX
3470 BNE Prtlp
3480 .Prted
3490 JSR osnewl
3500 :
3510 .regain
3520 PLA
3530 TAY
3540 PLA
3550 TAX
3560 PLA
3570 RTS
3580 :
3590 .ThisSlot
3600 EQUB 0
3610 .temp
3620 EQUB 0
3630 :
3640 .NotHelp
3650 ]
3660 IF numkeywds%=0:[O
PT pass%:JMP other:]:ELS
E:PROCkwcode
3670 IF numvects%>0:PRO
Cclaimcode
3680 other=P%
3690 IF numsc%>0:PROCSe
rvcode
3700 :
3710 [OPT pass%
3720 JMP regain
3730 :
3740 .error
3750 PLA
3760 STA Errptr+1
3770 PLA
3780 STA Errptr+2
3790 LDX #0
3800 .Errlp
3810 INX
3820 .Errptr
3830 LDA &FFFF,X
3840 STA &100,X
3850 BNE Errlp
3860 LDA #0
3870 STA &100
3880 JMP &100
3890 :
10000 .break
10010 LDA #0
10020 STA onoff
10030 RTS
10040 :
10050 .iserror
10060 BIT onoff
10070 BPL P%+5
10080 JSR reset
```

Continued ▶

◀ **Hit & RAM continued**

```
10090 RTS
10100 :
10110 .swap
10120 LDA #&FF
10130 STA onoff
10140 LDA #&C8
10150 LDX #1
10160 LDY #2
10170 JSR osbyte
10180 JSR claim
10190 LDA #&FC
10200 JSR osbyteread
10210 STX temp
10220 LDA #&BB
10230 JSR osbyteread
10240 CPX temp
10250 BNE inWW
10260 :
10270 LDY #0
10280 STY ignore
10290 DEY
10300 STY btowflag
10310 STY wrchon
10320 LDY #&FD
10330 STY promptcount
10340 LDY #&FA
10350 STY leadcount
10360 LDA #buffer MOD 25
6
10370 STA send+1
10380 LDA #buffer DIV 25
6
10390 STA send+2
10400 LDA #BtoWst MOD 25
6
10410 STA fetch+1
10420 LDA #BtoWst DIV 25
6
10430 STA fetch+2
10440 RTS
10450 :
10460 .inWW
10470 LDY #0
10480 STY btowflag
10490 STY wrchon
10500 STY cplxflag
10510 DEY
10520 STY rdnumflag
10530 LDA #buffer MOD 25
6
10540 STA read+1
10550 LDA #buffer DIV 25
6
10560 STA read+2
10570 LDA #WtoBst MOD 25
6
10580 STA fetch+1
10590 LDA #WtoBst DIV 25
6
10600 STA fetch+2
10610 RTS
10620 :
10630 .btowflag
10640 EQUB 0
10650 .cplxflag
10660 EQUB 0
10670 .wrchon
10680 EQUB 0
10690 .rdnumflag
10700 EQUB 0
10710 .leadcount
10720 EQUB 0
10730 .promptcount
10740 EQUB 0
10750 .ignore
10760 EQUB 0
10770 .ext
10780 EQUW 0
10790 .onoff
10800 EQUB 0
10810 .temp
10820 EQUB 0
10830 :
10840 .BtoWst
10850 EQUS "LISTO 0"
10860 EQUB &D
10870 EQUS "LIST"
10880 EQUB &D
10890 EQUS "*WORDWISE"
10900 EQUB &D
10910 EQUS ":NEW"
10920 EQUB &D
10930 EQUS "2"
10940 EQUB &D
10950 EQUS "*"
10960 EQUW &D
10970 :
10980 .WtoBst
10990 EQUS "11"
11000 EQUB &D
11010 EQUS "*BASIC"
11020 EQUW &D
11030 :
11040 .num10
11050 EQUS "00010"
11060 EQUB 0
11070 :
11080 .number
11090 EQUD 0
11100 EQUW 0
11110 :
11120 .newrdchv
11130 STX temp
11140 LDA btowflag
11150 BMI fetch
11160 .reenterrd
11170 LDA cplxflag
11180 BEQ fetch
11190 LDA rdnumflag
11200 BEQ read
11210 .fetch
11220 LDA &FFFF
11230 BEQ finread
11240 INC fetch+1
11250 BNE P%+5
11260 INC fetch+2
11270 .outread
11280 LDX temp
11290 CLC
11300 RTS
11310 .finread
11320 LDA btowflag
11330 BMI stopread
11340 LDX #&FF
11350 LDA cplxflag
11360 STX cplxflag
11370 BPL startnums
11380 INX
11390 STX rdnumflag
11400 BEQ reenterrd
11410 .startnums
11420 LDX #4
11430 .startnumlp
11440 LDA num10,X
11450 STA number,X
11460 DEX
11470 BPL startnumlp
11480 JSR startline
11490 JMP reenterrd
11500 .stopread
11510 TYA
11520 PHA
11530 JSR reset
11540 PLA
11550 TAY
11560 LDA #&D
11570 JMP outread
11580 :
11590 .read
11600 LDA &FFFF
11610 BEQ stopread
11620 INC read+1
11630 BNE P%+5
11640 INC read+2
11650 CMP #&D
11660 BNE outread
11670 LDX #3
11680 .nxnumlp
11690 INC number,X
11700 LDA number,X
11710 CMP #&3A
11720 BNE numset
11730 LDA #&30
11740 STA number,X
11750 DEX
11760 BPL nxnumlp
11770 .numset
11780 JSR startline
11790 LDX temp
11800 LDA #&D
11810 CLC
11820 RTS
11830 :
11840 .startline
11850 LDX #&FF
11860 STX rdnumflag
11870 LDA #number MOD 25
6
11880 STA fetch+1
11890 LDA #number DIV 25
6
11900 STA fetch+2
11910 RTS
11920 :
11930 .newwrchv
11940 STX temp
11950 BIT wrchon
11960 BPL nosend
11970 CMP #&A
11980 BEQ nosend
11990 CMP #&D
12000 BNE ntcarret
12010 ROL ignore
12020 LDX #0
12030 STX ignore
12040 LDX #&FA
12050 STX leadcount
12060 BCS nosend
12070 BCC send
12080 .ntcarret
12090 BIT ignore
12100 BMI nosend
12110 .consider
12120 LDX leadcount
12130 BPL send
12140 CMP #ASC">"
12150 BNE ntprompt
12160 DEC ignore
12170 INC promptcount
```

Continued ▶

◀ Hit & RAM continued

```
12180 BNE nosend
12190 SEC
12200 LDA send+1
12210 SBC #buffer MOD 25
6
12220 STA ext
12230 LDA send+2
12240 SBC #buffer DIV 25
6
12250 STA ext+1
12260 LDA #0
12270 STA wrchon
12280 JSR send
12290 BIT send+2
12300 BVC P%+5
12310 JMP toolong
12320 LDA #ASC">"
12330 BNE nosend
12340 .ntprompt
12350 INC leadcount
12360 BMI nosend
12370 .send
12380 STA &FFFF
12390 INC send+1
12400 BNE P%+5
12410 INC send+2
12420 .nosend
12430 LDX temp
12440 RTS
12450 :
12460 .newfilev
12470 STX addr
12480 STY addr+1
12490 TAX
12500 LDA #buffer MOD 25
6
12510 STA buffadd
12520 LDA #buffer DIV 25
6
12530 STA buffadd+1
12540 TXA
12550 BEQ save
12560 :
12570 LDY #2
12580 LDA (addr),Y
12590 STA fileadd
12600 INY
12610 LDA (addr),Y
12620 STA fileadd+1
12630 LDY #0
12640 .loadlp
12650 LDA (buffadd),Y
12660 BEQ finload
12670 STA (fileadd),Y
12680 INY
12690 BNE loadlp
12700 INC buffadd+1
12710 INC fileadd+1
12720 BNE loadlp
12730 .finload
12740 LDY #&A
12750 LDA ext
12760 STA (addr),Y
12770 INY
12780 LDA ext+1
12790 STA (addr),Y
12800 INY
12810 LDA #0
12820 STA (addr),Y
12830 INY
12840 STA (addr),Y
12850 LDY addr+1
12860 LDX addr
12870 LDA #1
12880 RTS
12890 :
12900 .save
12910 LDY #&A
12920 LDA (addr),Y
12930 STA fileadd
12940 INY
12950 LDA (addr),Y
12960 STA fileadd+1
12970 LDY #&E
12980 SEC
12990 LDA (addr),Y
13000 SBC fileadd
13010 TAX
13020 INY
13030 LDA (addr),Y
13040 SBC fileadd+1
13050 STA temp
13060 LDY #0
13070 TXA
13080 BNE savelp
13090 DEC temp
13100 BMI endsave
13110 .savelp
13120 LDA (fileadd),Y
13130 BMI badchar
13140 CMP #10
13150 BCC badchar
13160 STA (buffadd),Y
13170 INY
13180 BNE uppersame
13190 INC buffadd+1
13200 INC fileadd+1
13210 .uppersame
13220 DEX
13230 BNE savelp
13240 DEC temp
13250 BPL savelp
13260 .endsave
13270 LDA #&D
13280 STA (buffadd),Y
13290 INY
13300 BNE P%+4
13310 INC buffadd+1
13320 LDA #0
13330 STA (buffadd),Y
13340 CLC
13350 TYA
13360 ADC buffadd
13370 BCC P%+4
13380 INC buffadd+1
13390 BIT buffadd+1
13400 BVS toolong
13410 LDY addr+1
13420 LDX addr
13430 RTS
13440 :
13450 .badchar
13460 JSR error
13470 EQUB 90
13480 EQUS "Illegal char
acter"
13490 EQUB 0
13500 :
13510 .toolong
13520 JSR error
13530 EQUB 91
13540 EQUS "Program too
long"
13550 EQUB 0
13560 :
13570 .newargsv
13580 CPY #0
13590 BNE findext
13600 LDA #4
13610 RTS
13620 .findext
13630 PHA
13640 LDA ext
13650 STA 0,X
13660 LDA ext+1
13670 STA 1,X
13680 LDA #0
13690 STA 2,X
13700 STA 3,X
13710 PLA
13720 RTS
13730 :
13740 .newfindv
13750 CMP #0
13760 BEQ outfindv
13770 LDA btowflag
13780 AND #&20
13790 .outfindv
13800 RTS
13810 :
13820 .reset
13830 LDA #0
13840 STA onoff
13850 JSR unclaim
13860 LDA #&C8
13870 LDX #0
13880 LDY #2
13890 JMP osbyte
13900 :
13910 .osbyteread
13920 LDX #0
13930 LDY #&FF
13940 JMP osbyte
13950 :
13960 .buffer
13970 :
13980 ]
13990 ENDPROC
```

See The Hodgepodge machine, page 78

```
10 REM The HODGEPODGE machine
20 REM by Andrew Green
30 REM for Archimedes only
40 REM (c) BAU March 1989
50 :
60 ON ERROR PROCinterrupt
70 PROCinitialise
80 PROCprocess
90 END
100 :
```

Continued▶

◀ **Hodgepodge continued**

```
 110 DEF PROCinterrupt
 120 VDU 6
 130 *FX 112,0
 140 *FX 113,0
 150 @%=F%
 160 COLOUR 3
 170 IF ERR=17 THEN
 180 COLOUR 149
 190 PRINT TAB(1,29);SPC(28)
 200 PRINT TAB(1,31);SPC(28)
 210 REPEAT
 220 PRINT TAB(1,30)"      ANOTHER GO (Y
/N)?      "
 230 A$=GET$
 240 UNTIL INSTR("YyNn",A$)
 250 IF INSTR("Yy",A$) THEN RUN
 260 ELSE
 270 PRINT TAB(0,30)REPORT$;" AT LINE "
;ERL
 280 ENDIF
 290 COLOUR 128
 300 PRINT TAB(0,31);
 310 ON
 320 END
 330 :
 340 DEF PROCinitialise
 350 LOCAL IB%,OB%
 360 F%=@%
 370 @%=&808
 380 IF N%<2 OR N%>255 THEN N%=250
 390 IF Q%<1 OR Q%>255 THEN Q%=75
 400 IF S%<1 OR S%>2 THEN S%=1
 410 n=N%
 420 g=Q%
 430 k1=2
 440 k2=3
 450 PROCinquire(n,g)
 460 IF S%=2 THEN
 470 xytop=960
 480 ygap=80+320
 490 ELSE
 500 xytop=964
 510 ygap=79
 520 ENDIF
 530 DIM IB% 20
 540 DIM OB% 20
 550 !IB%=148
 560 IB%!4=150
 570 IB%!8=-1
 580 SYS "OS_ReadVduVariables",IB%,OB%
 590 PROCcheckscreensize(OB%!4)
 600 screen1=!OB%
 610 screen2=screen1+&14000
 620 offset=&14000-(320*4)
 630 G%=screen1+offset
 640 H%=screen2+offset
 650 VDU21
 660 DIM  hodgepodge 2000
 670 FOR pass=0 TO 3 STEP 3
 680 PROCassemble(pass,hodgepodge,n,g)
 690 NEXT pass
 700 VDU6
 710 MODE 13
 720 OFF
 730 *FX 112,2
 740 CLG
 750 PROCshowparams
 760 *FX 112,1
 770 CLG
 780 PROCshowparams
 790 PROCsetuphodgepodge(n)
 800 ENDPROC
 810 :
 820 DEF PROCprocess
 830 T%=1
 840 COLOUR 11
 850 COLOUR 128+21
 860 REPEAT
 870 CALL hodgepodge
 880 WAIT
 890 IF G%<H% THEN
 900 *FX 113,2
 910 *FX 112,2
 920 ELSE
 930 *FX 113,1
 940 *FX 112,1
 950 ENDIF
 960 PRINT TAB(31,1)T%
 970 T%+=1
 980 SWAP G%,H%
 990 UNTIL FALSE
1000 ENDPROC
1010 :
1020 DEF PROCinquire(RETURN n,RETURN g)
1030 MODE 13
1040 COLOUR 23
1050 PRINT TAB(2,2)"HODGEPODGE CELLULAR
AUTOMATA"
1060 COLOUR 56
1070 PRINT TAB(4,6)"Cell size = ";S%
1080 PRINT TAB(5,8)"k1 = ";k1
1090 PRINT TAB(5,9)"k2 = ";k2
1100 PRINT TAB(5,10)" n = ";n
1110 PRINT TAB(5,11)" g = ";g
1120 COLOUR 43
1130 INPUT TAB(5,15)"new n (2-255) : "A
$
1140 T%=VAL(A$)
1150 IF T%>1 AND T%<256 THEN n=T%
1160 PRINT TAB(21,15);n;"    "
1170 INPUT TAB(5,17)"new g (1-255) : "A
$
1180 T%=VAL(A$)
1190 IF T%>0 AND T%<256 THEN g=T%
1200 PRINT TAB(21,17);g;"    "
1210 INPUT TAB(5,19)"new size (1-2): "A
$
1220 T%=VAL(A$)
1230 IF T%>0 AND T%<3 THEN S%=T%
1240 PRINT TAB(21,19);S%;"        "
1250 N%=n
1260 Q%=g
1270 OFF
1280 ENDPROC
1290 :
1300 DEF PROCcheckscreensize(size%)
1310 IF size%>=&28000 THEN ENDPROC
1320 CLS
1330 COLOUR 99
1340 PRINT '
1350 PRINT "****************************
*************"
1360 PRINT "This program requires 160K
of screen RAM"
1370 PRINT "****************************
*************"
1380 PRINT '
1390 PRINT " -- RECONFIGURE SCREENSIZE
to 20"
1400 PRINT
1410 PRINT "ie  *CONFIGURE SCREENSIZE 2
0"
1420 PRINT
1430 PRINT " -- then press <CTR-BREAK>"
1440 PRINT '''''''
1450 END
```

Continued ▶

◀ **Hodgepodge continued**

```
1460 :
1470 DEF PROCshowparams
1480 COLOUR 8
1490 COLOUR 128
1500 PRINT TAB(31,4)"k1 = ";k1
1510 PRINT TAB(31,5)"k2 = ";k2
1520 PRINT TAB(31,6)" n = ";n
1530 PRINT TAB(31,7)" g = ";g
1540 ENDPROC
1550 :
1560 DEF PROCsetuphodgepodge(n)
1570 LOCAL x,y,o,R,L%
1580 R=n+1
1590 o=G%
1600 IF S%=2 L%=TRUE ELSE L%=FALSE
1610 FOR x=xytop TO 4*S% STEP-4*S%
1620 o-=ygap
1630 FOR y=xytop TO 4*S% STEP-4*S%
1640 o-=S%
1650 ?o=RND(R)-1
1660 IF L% THEN o?1=?o:o?320=?o:o?321=?
o
1670 NEXT
1680 NEXT
1690 ENDPROC
1700 :
1710 DEF PROCassemble(pass,org,n,g)
1720 LOCAL S,A,t,x,y,old,new,B,basic
1730 LOCAL sp,link,pc
1740 temp=0:result=0
1750 S=1:dividend=S
1760 A=2:divisor=A
1770 t=3
1780 x=4
1790 y=5
1800 old=6
1810 new=7
1820 B=8
1830 d3=9
1840 d5=10
1850 d6=11
1860 d7=12
1870 sp=13
1880 basic=14:d9=14
1890 pc=15
1900 P%=org
1910 [
1920 OPT pass
1930 STMFD (sp)!,{basic}
1940 ADR r0,data
1950 LDR d3,[r0]
1960 LDR d5,[r0,#4]
1970 LDR d6,[r0,#8]
1980 LDR d7,[r0,#12]
1990 LDR d9,[r0,#16]
2000 MOV x,#xytop
2010 .forx
2020 SUB old,old,#ygap
2030 SUB new,new,#ygap
2040 MOV y,#xytop
2050 .fory
2060 SUB new,new,#S%
2070 SUB old,old,#S%
2080 LDRB t,[old]
2090 CMP t,#n
2100 MOVEQ t,#0
2110 BEQ plot
2120 MOV A,#0
2130 MOV B,#0
2140 MOV S,#0
2150 MOV temp,t
2160 FNcheckcell
2170 LDRB temp,[old,#-(321*S%)]
2180 FNcheckcell
2190 LDRB temp,[old,#-(320*S%)]
2200 FNcheckcell
2210 LDRB temp,[old,#-(319*S%)]
2220 FNcheckcell
2230 LDRB temp,[old,#-S%]
2240 FNcheckcell
2250 LDRB temp,[old,#(321*S%)]
2260 FNcheckcell
2270 LDRB temp,[old,#(320*S%)]
2280 FNcheckcell
2290 LDRB temp,[old,#(319*S%)]
2300 FNcheckcell
2310 LDRB temp,[old,#S%]
2320 FNcheckcell
2330 CMP t,#0
2340 ADRNE temp,divtable
2350 ADDNE pc,temp,divisor,ASL#4
2360 CMP B,#6
2370 MOVGE t,#1
2380 CMP B,#3
2390 ADDGE t,t,#1
2400 ADD t,t,A,ASR#1
2410 .return
2420 CMP t,#n
2430 MOVGT t,#n
2440 .plot
2450 FNplotpoint(t,new)
2460 .nexty
2470 SUBS y,y,#(4*S%)
2480 BNE fory
2490 .nextx
2500 SUBS x,x,#(4*S%)
2510 BNE forx
2520 LDMFD (sp)!,{pc}
2530 .divtable
2540 MOV result,#&10000
2550 ADD t,result,#g
2560 B return
2570 FNOP
2580 MOV result,dividend
2590 ADD t,result,#g
2600 B return
2610 FNOP
2620 MOV result,dividend,ASR#1
2630 ADD t,result,#g
2640 B return
2650 FNOP
2660 MUL result,dividend,d3
2670 MOV result,result,ASR#16
2680 ADD t,result,#g
2690 B return
2700 MOV result,dividend,ASR#2
2710 ADD t,result,#g
2720 B return
2730 FNOP
2740 MUL result,dividend,d5
2750 MOV result,result,ASR#16
2760 ADD t,result,#g
2770 B return
2780 MUL result,dividend,d6
2790 MOV result,result,ASR#16
2800 ADD t,result,#g
2810 B return
2820 MUL result,dividend,d7
2830 MOV result,result,ASR#16
2840 ADD t,result,#g
2850 B return
2860 MOV result,dividend,ASR#3
2870 ADD t,result,#g
2880 B return
2890 FNOP
2900 MUL result,dividend,d9
```

Continued▶

◀ Hodgepodge continued

```
2910 MOV result,result,ASR#16
2920 ADD t,result,#g
2930 B return
2940 .data
2950 EQUD (2^16)/3+1
2960 EQUD (2^16)/5+1
2970 EQUD (2^16)/6+1
2980 EQUD (2^16)/7+1
2990 EQUD (2^16)/9+1
3000 ]
3010 ENDPROC
3020 :
3030 DEF FNcheckcell
3040 [
3050 OPT pass
3060 CMP temp,#n
3070 ADDEQ B,B,#1
3080 CMPNE temp,#0
3090 ADDNE A,A,#1
3100 ADD S,S,temp
3110 ]
3120 =""
3130 :
3140 DEF FNplotpoint(colour,addr)
3150 [
3160 OPT pass
3170 STRB colour,[addr]
3180 ]
3190 IF S%=2 THEN
3200 [
3210 OPT pass
3220 STRB colour,[addr,#1]
3230 STRB colour,[addr,#320]
3240 STRB colour,[addr,#321]
3250 ]
3260 ENDIF
3270 =""
3280 :
3290 DEF FNOP
3300 [
3310 OPT pass
3320 MOVNV r0,r0
3330 ]
3340 =""
```

See Spyro Mania, page 87

```
 10 REM >Rose
 20 REM Version 1.01 : 12 Jan 1989
 30 REM by Steve MacGuire
 40 REM for B/B+/M/C/E/A
 50 REM (c) BBC Acorn User 1989
 60 :
 70 MODE 0
 80 PROCinit
 90 REPEAT
100 ON ERROR VDU 12,26:END
110 PROCinput
120 ON ERROR RUN
130 PROCrose
140 UNTIL FALSE
150 END
160 :
170 DEF PROCrose
180 A%=0
190 CLG
200 REPEAT
210 A%=(A% + D%) MOD 360
220 R=S%*SIN RAD((N%*A%) MOD 360)
230 T=RAD(A%)
240 DRAW R*SIN T,R*COS T
250 UNTIL A%=0
260 IF F% THEN A%=INKEY 100
270 ENDPROC
280 :
290 DEF PROCinit
300 VDU 19,0,4;0;
310 VDU 24,256;0;1279;1023;
320 VDU 29,768;512;
330 VDU 25,4,0;0;
340 VDU 28,0,31,15,0
350 PRINT "THE ROSE"
360 S%=500
370 F%=FALSE
380 ENDPROC
390 :
400 DEF PROCinput
410 IF F% THEN PROCrandom ELSE PROCcho
ose
420 ENDPROC
430 :
440 DEF PROCrandom
450 N%=RND(359)
460 D%=RND(359)
470 PRINT '"N = ";N%
480 PRINT "D = ";D%
490 ENDPROC
500 :
510 DEF PROCchoose
520 PRINT '"Enter values"'"for N and D
"
530 PRINT '"1-359  for rose"'"Return f
or demo"
540 INPUT '"N = "N%
550 G%=(N%>0) AND (N%<360)
560 IF G% THEN INPUT "D = "D%
570 G%=G% AND (D%>0) AND (D%<360)
580 F%=(N%=0) OR (D%=0)
590 IF NOT G% THEN PROCrandom
600 ENDPROC
610 :
620 DEF PROC@
630 T%=PAGE+?(PAGE+3)+6
640 T$="Version "+LEFT$(STR$(VAL(MID$(
$T%,9,4))+0.01),4)+" : "
650 IF INKEY-256=253 THEN T$=T$+MID$(T
IME$,5,11) ELSE T$=T$+RIGHT$($T%,11)
660 IF LEN(T$)=LEN($T%) THEN $T%=T$
670 T$=$(PAGE+6)
680 T%=INSTR(T$,">")+1
690 T$=MID$(T$,T%)
700 OSCLI("SAVE "+T$+" "+STR$~PAGE+" "
+STR$~TOP+" FFFF802B FFFF0E00")
710 ENDPROC
```

ORDER FORM

5.25-INCH DISC SUBSCRIPTIONS

Yes! Please start my 5.25-inch disc subscription with the ______ issue.

01 UK	☐	£40.00
02 UK (with *BBC Acorn User* magazine)	☐	£50.00
03 EUROPE (Airmail)	☐	£76.00
03 OVERSEAS (Surface)	☐	£76.00
04 OVERSEAS (Airmail)	☐	£84.00

TOTAL VALUE £______

5.25-INCH MONTHLY DISCS

1988		1989
☐ JAN 0228-3	☐ JUL 0234-8	☐ JAN 0240-2
☐ FEB 0229-1	☐ AUG 0235-6	☐ FEB 0241-0
☐ MAR 0230-5	☐ SEPT 00236-4	☐ MAR 0242-9
☐ APR 0231-3	☐ OCT 0237-2	
☐ MAY 0232-1	☐ NOV 0238-0	
☐ JUN 0233-X	☐ DEC 0239-9	

UK = £5.95
Europe = £6.95
Overseas = £7.95

TOTAL VALUE £______

3.5-INCH DISC SUBSCRIPTIONS

Yes! Please start my 3.5-inch disc subscription with the ______ issue.

01 UK	☐	£55.00
02 EUROPE (Airmail)	☐	£76.00
02 OVERSEAS (Surface)	☐	£76.00
03 OVERSEAS (Airmail)	☐	£84.00

TOTAL VALUE £______

3.5-INCH MONTHLY DISCS

1988		1989	
☐ AUGUST	0501-0	☐ JANUARY	0506-1
☐ SEPTEMBER	0502-9	☐ FEBRUARY	0507-X
☐ OCTOBER	0503-7	☐ MARCH	0508-8
☐ NOVEMBER	0504-5		
☐ DECEMBER	0505-3		

Monthly 3.5-inch discs are suitable for the Master Compact and the Archimedes.

UK = £6.95
Europe = £7.95
Overseas = £8.95

TOTAL VALUE £______

MAGAZINE SUBSCRIPTIONS

Yes! Please start my subscription with the ______ issue.
(UK subscribers should see page 40.)

	12 issues	27 issues
01 UK	£18.95	£35.00
02 UK WITH 5.25-inch DISC	£55.00	£110.00
03 EUROPE	£28.00	£50.00
04 MIDDLE EAST	£35.00	£60.00
05 THE AMERICAS AND AFRICA	£40.00	£70.00
06 REST OF THE WORLD	£45.00	£80.00

TOTAL VALUE £______

MAGAZINE BACK ISSUES

1987	1988	1989
☐ JAN 0044-2	☐ JAN 0056-6	☐ JAN 0068-X
☐ MAR 0046-9	☐ FEB 0057-4	☐ FEB 0069-8
☐ APR 0047-7	☐ MAR 0058-2	☐ MAR 0070-1
☐ MAY 0048-5	☐ APR 0059-0	
☐ JUN 0049-3	☐ JUN 0061-2	
☐ JUL 0050-7	☐ JUL 0062-0	
☐ AUG 0051-5	☐ AUG 0063-9	
☐ SEP 0052-3	☐ SEPT 0064-7	
☐ OCT 0053-1	☐ OCT 0065-5	
☐ NOV 0054-X	☐ NOV 0066-3	
☐ DEC 0055-8	☐ DEC 0067-1	

UK = £1.95
Europe = £2.95
Overseas = £3.95

TOTAL VALUE £______

BINDERS

☐ MAGAZINE BINDER 1201-7

UK = £4.95
Europe = £7.95
Overseas = £14.95

TOTAL VALUE £______

24-HOUR TELEPHONE SERVICE (0672) 40825

ORDER FORM

ACORN USER SPECIAL DISCS AND ROMS

GRAPHICS UTILITIES DISC
40-track 0830-3 ☐
UK = £7.95
Europe = £8.95
Overseas = £9.95

EDUCATION DISC
40-track 0815-X ☐

VIEWCHART DISC
40-track 0920 ☐
UK = £12.95
Europe = £13.95
Overseas = £14.95

1987 COMPILATION DISC
80-track 0990-3 ☐
UK = £6.95
Europe = £7.95
Overseas = £8.95

☐ USER DUMP 1001-4
☐ USER ROM 1002-2
☐ AXR ROM 1003-0
UK = £19.95
Europe = £20.95
Overseas = £21.95

SIDEWAYS RAM UTILITIES DISC
40-track 0825-7 ☐
UK = £9.95
Europe = £10.95
Overseas = £11.95

CALLIGRAPHY
40/80-track 0950-4 ☐

PORTFOLIO DISC
80-track 0970-9 ☐

NETWORK UTILITIES DISC
80-track 0809-5 ☐
UK = £19.95
Europe = £20.95
Overseas = £21.95

GAMES DISC ☐
80-track, double sided 0610-6
UK = £8.95
Europe = £9.95
Overseas = £10.95

TOTAL VALUE £__________

☐ I enclose a cheque/postal order for a total of ________________ made payable to Redwood Publishing Ltd

☐ Please debit my ☐ Visa (Barclaycard) ☐ Access (Mastercard)

Credit card number ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ **Expiry date** ☐☐☐☐

SIGNED DATE

MR/MRS/MISS/MS INITIALS SURNAME

ADDRESS

POSTCODE TELEPHONE

Return your order to: Redwood Publishing Ltd, *BBC Acorn User* Mail Order, Marlborough Rd, Aldbourne, Wilts SN8 2DD.

For Office Use Only

0 0 ☐☐ ☐ ☐☐☐☐☐☐

2 0 0 1 X 3 1 0 N Y D P ☐☐☐ ☐☐☐

B41 ☐☐☐☐☐☐☐

24-HOUR TELEPHONE SERVICE (0672) 40825

OFFERS

THIS MONTH'S LISTINGS

The 5.25-inch and 3.5-inch discs for March have a mix of programs that are sure to interest all our readers. There's David Harper's program to make sideways RAM programming simple, with his utility for *Wordwise Plus* users.

Remember Spirograph? Now *BBC Acorn User* has produced the computer version; make your own original patterns or just admire the demonstration.

Hints and Tips includes a Basic program



which allows you to reflect any part of the screen, plus there's Cut and Paste, a super sideways ROM image you will be happy to add to your collection. And there's a revamped version of August '88's screen printing program.

For the Archimedes only, but included on both discs, there is the Hodgepodge machine. Plus in Agora there is an easy way to back up hard discs – saving floppy discs by compressing the data.

There's a Hodgepodge of programs on March's disc

GAMES DISC

Ten of the best *Acorn User* games on one 80-track double-sided 5.25-inch disc.

Whether you're into arcade or adventure type games this new disc has something for everyone. The games included are *Warlord, Wizalon, Castle of Nightmares, Run Silent, Run Deep, Polyominoes* and *Quadline*. We have also included three of the most popular one-line games from recent Abusers. Test your knowledge with *Mastermind* and start playing *Varpon* and *Lurch* to win.

Make sure you get your disc of fun and entertainment and send off for the Games disc today. At only £8.95 it will make the perfect gift.

Games galore for just £8.95

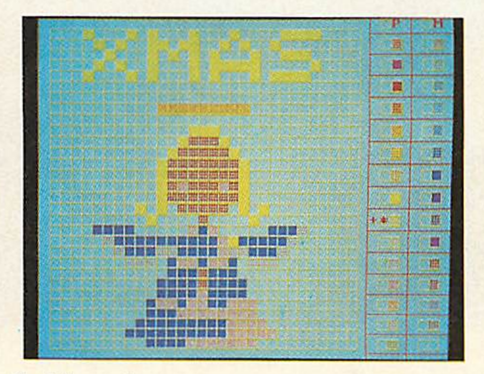


'87 COMPILATION DISC

Acorn User has put all your favourite programs, routines and utilities from 1987 on one disc.

Featured are: Kiddie Art; Tapestry; PCB by CAD; Autumn and Theme, our music programs from April '87. Also featuring on the disc is Joe Telford's GEM-like front end for the Master including a desktop calendar and year planner.

Other useful utilities include a proportional screen dump, a *View* printer



driver generator, a monitor-testing routine and a routine for printing spreadsheets sideways.

The second half of the disc is devoted to graphics, with a video image enhancer and six of the best Graphics Bonuses.

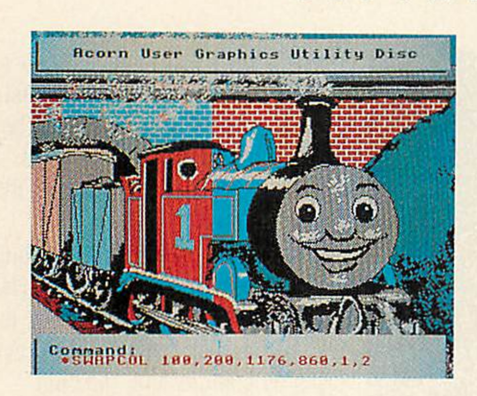
The *Acorn User* '87 Compilation disc comes in 5.25-inch 80-track format, with a comprehensive manual which includes all function key strips and instructions needed for the programs.

All the very best of '87 on one disc

ORDER BY TELEPHONE (0672) 40825

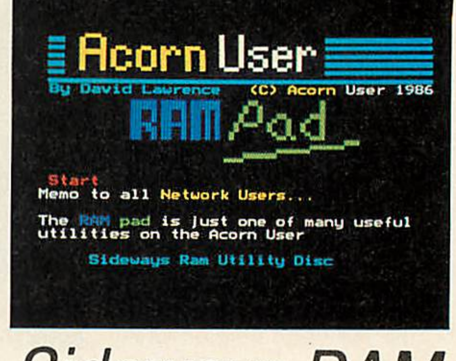
OFFERS

SOFTWARE & GRAPHICS



Great graphics utilities

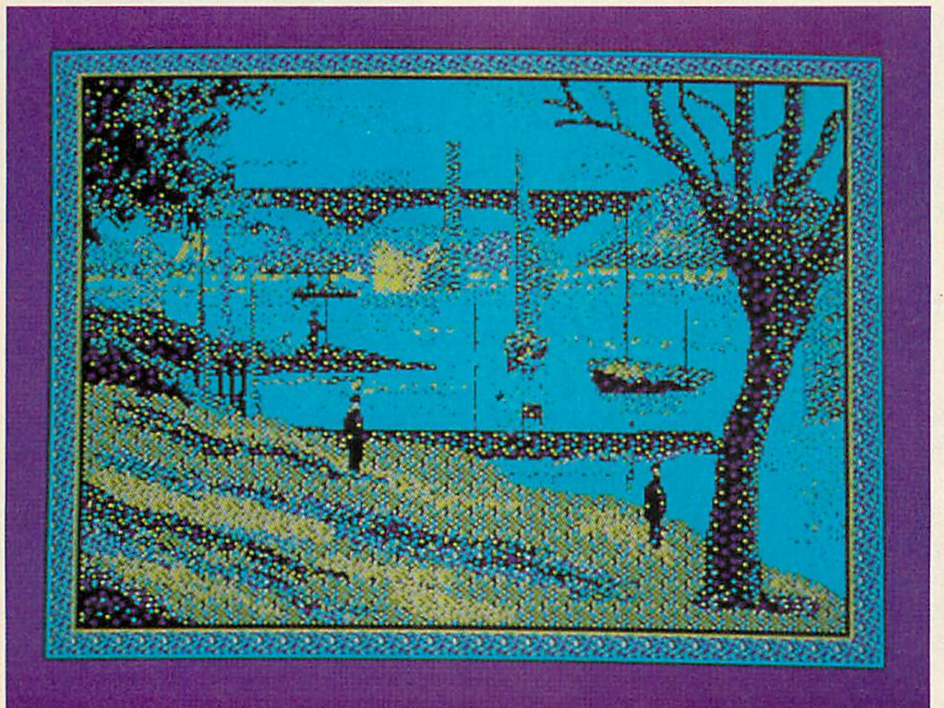
The 40-track 5.25-inch *Graphics Utilities* disc, keenly priced at £7.95, features 16 stand-alone machine code utilities, an advanced teletext editor, several useful Basic procedures, an easy-to-adapt disc header and index. Included are: *ROTATE, rotates area through 180 degrees; *SWAPCOL, swaps two colours; *COLFILL, a colour-fill routine; *SVPIC, saves a compacted picture; *LDPIC, reloads a compacted picture. There are many utilities to manipulate graphics.



Sideways RAM made simple

The *Acorn User* sideways RAM disc gives you many more utilities for your sideways RAM. These include: RAMpad – your computer's answer to the pad and pen; six different on-screen fonts available in all modes; a 15k printer buffer; Screen Swap – store and recall mode 4 or 5 screens; *ROMHEAD – standard service ROM header; *RLOOK – allows you to examine sideways RAM or ROM.

There are many more utilities on this 40/80-track 5.25-inch disc and it's a snip at £9.95.



Micro masterpieces on Portfolio for £9.95

Jonathan Inglis, freelance illustrator, has assembled a *Portfolio* of his best work exclusively for *BBC Acorn User*.

The disc contains screens that have been used by national and regional publications. Included are Seurat's *Bathers*, a *Time Out* cover from August 1985, and two familiar *Acorn User* covers, Willow (Nov '86) and Magician (Jan '86), as well as several pictures commissioned by *The Times*.

Three of Jonathan's favourite masterpieces are on the disc; Seurat's *Riverside*, Vermeer's *Lady at the Virginal* and a copy of a famous lithograph by Matisse. Sade fans will probably be more interested in the two stunning portraits of the singer included on the disc.

You can create your own *pièce de résistance* using the Pixel Editor and Super Painter programs. Pixel Editor allows you to draw in and alter minute detail, while Super Painter enables you to draw lines, texture your screen and shade by mixing the eight standard colours.

Portfolio comes in 80-track 5.25-inch format with a comprehensive instruction sheet telling you about the pictures and how the artist created them. This disc can be yours for only £9.95.

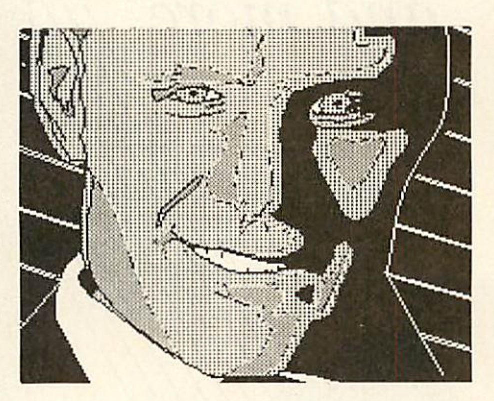
TO ORDER USE THE FORM ON PAGE 114

OFFERS

USERDUMP ROM

BBC/B/ B-/M/ C The *UserDump* ROM will allow you to dump any screen image in any display mode by entering a single command – either as a line of your program or by typing it directly from the keyboard. A perfect dump can also be obtained while a machine code program is running.

UserDump can dump a graphics window, make a distortion-free dump of mode 0 screens using plotter graphics, translate a teletext screen into mode 1, and shift any area of memory.

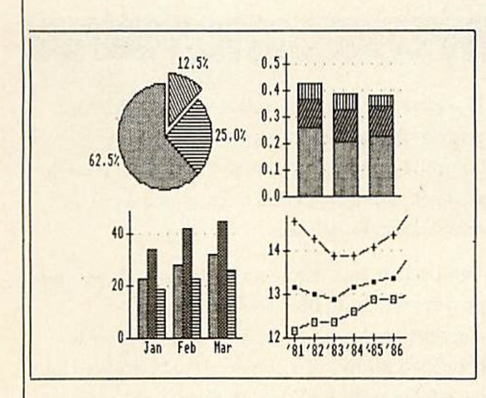


UserDump will work with any Epson-compatible printer which has single-density and double-density bit-image graphics including the Star Gemini, Delta, SG, SD and SR, Canon and Kaga NLQ.

Details of further commands and printer compatibility are available from Seran at Redwood Publishing Ltd, 20-26 Brunswick Place, London N1 6DJ.

Trouble-free screen dumps for £19.95 with UserDump

VIEWCHART DISC



BBC/B/ B-/M/ C *ViewChart* features a suite of programs which can be used to produce high-resolution graphics in pie chart, bar chart or line graph form. Data can be entered manually, or read from *ViewSheet*, *ViewStore* or *View* files.

Present figures with ViewChart

The charts can be labelled and shaded to give a really professional appearance.

Epson-compatible screen dumps are included, one of which will produce a print-out to the full width of an A4 sheet. Screen dumps for other printers can be painlessly installed.

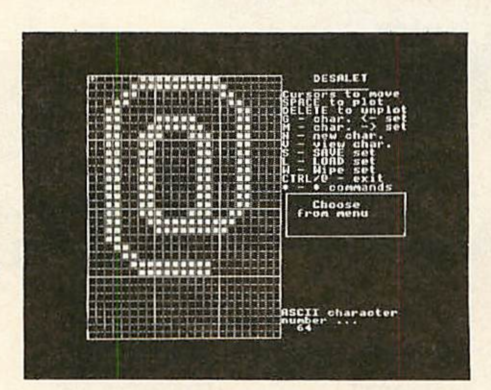
The software is provided on a 5.25-inch 40-track disc (with 80-track converter). And the price of this professional package? Just £12.95.

CALLIGRAPHY DISC

BBC/B/ B-/M/ C/E Now you can produce anything from professional tickets to letterheads and posters with the *Calligraphy* disc.

Desalet is a font creator which produces customised letters to your personal design and saves you using repetitive data statements and error-prone calculations. All font sets can be up to 94 characters long.

Modical allows the use of disc-based font sets created with *Desalet*. *Modical* incorporates a modified file creation program, which allows files to be printed out immediately or saved for later.



An enhanced font ROM, in the form of a sideways RAM image, allows you to design your own fonts for use on-screen. Any output to the printer will be in the new font – thus giving true Wysiwyg.

This superb disc comes on 40/80-track 5.25-inch disc and is only £9.95.

Design your own fonts with Calligraphy

ORDER WITH THE FORM ON PAGE 114



FAX • P A C K •

With the ever increasing popularity of FAX machines this form of document communication is set to replace conventional postal deliveries with a fast, reliable, strike free, electronic mail service.

FAX PACK brings this world of facsimile document transfer to the Archimedes. By combining the facilities of a FAX machine with the power and flexibility of a computer, FAX PACK offers considerable benefits over conventional FAX systems.

FAX PACK basically allows any document, be it printed text or graphics, or an electronic document such as a word processor file, to be sent to FAX machines anywhere in the world, in seconds. This is done by scanning (digitising) the document and then sending it digitally over a normal phone line to the receiving FAX machine which re-constructs the image and then prints it.

THE HARDWARE

The basic FAX PACK consists of a modem podule that plugs into any Archimedes computer, and the software to drive it. A variety of options are available such as scanners and power switching boxes.

The podule has connections for a scanner and power switching box (see below) and a conventional telephone line. An adapter is provided allowing a conventional phone to be paralleled with FAX PACK so that only one telephone line is required for both FAX and conventional use. However if a lot of FAX mail is going to be sent/received then a separate dedicated line is advisable.

Scanner & Sheet Feeder

Unlike many normal FAX machines the hardware also provides both auto-answer and auto-dial facilities making it convenient and allowing completely automatic operation without human intervention.

THE SOFTWARE

As part of FAX PACK this not only provides all the basic mechanisms for communicating with FAX machines but also includes high level WIMP based facilities for viewing FAXes on screen within a window, where they can be pixel edited, scaled, cropped,printed, etc.

This WIMP based software is simplicity itself to use so FAX PACK can be used in the office by staff with little or no computer experience. Of course unlike any conventional FAX machine FAXes can be viewed on screen, or filed away on disc for future reference without ever getting onto paper.

The software also allows text, word processed files, even graphics, to be automatically converted to a suitable FAX format for sending to other FAX machines. The paperless office becomes closer to reality since it is now possible to write articles, documents or letters and then send these directly to remote machines without involving paper.

However facilities are also included for printing FAXes to a range of 9 and 24 pin dot matrix, inkjet and laser printers.

SUPER FAST MODEM

The FAX podule actually consists of a 9600 bps auto-answer, auto-dial modem, and so can be used for much more than just FAX transfer. The software can detect the type of remote machine, and if it finds a similarly equipped computer (rather than a FAX machine) at the other end it can then transfer ANY file fully error checked and glitch free. And by using some very advanced transmission protocols it can transmit data 4 times faster than most conventional modems on normal telephone lines.

THE SCANNER

In order to send printed material it is necessary to digitise the page. An optional hand-held, A4 width, 200 dpi scanner can connect to the FAX podule. Being hand-held it is not only supremely compact, but it can digitise complete A4 pages, or pages from books or other awkward shaped documents.



Of course images scanned in this fashion are not only useful for FAX purposes but also for inclusion in word processor or desk top publishing programs. FAX PACK software allows company logos and signatures to be scanned, cropped and then included as part of other FAXed material.

An associated motorised sheet feeder can be supplied to go with this scanner. The scanner mounts on this sheet feeder which then automatically feeds A4 sheets under the scanner. This not only tends to be more accurate than scanning by hand, but is also more convenient.

AUTOMATIC POWER SWITCH

This external power switching box can automatically switch the computer on in order to answer incoming FAXes. The FAX podule can then answer the phone, receive the FAX and file it to disc, and then switch the computer off again. The computer can therefore be switched off and left completely unattended for very long periods of time.

GUARANTEE

Not only do we provide a one year guarantee for the product, but also a 28 day money back no quibble guarantee. Owners can also receive free software updates as enhanced or new facilities are made available.

FAX PACK Podule and software
£499 +VAT

200 dpi hand-held scanner
£299 +VAT

Associated sheet feeder
£150 +VAT

Power switching box
£74+VAT

The above prices include post and packing. Contact Computer Concepts or your local dealer for prices and availability.



Computer Concepts Ltd
Gaddesden Place,
Hemel Hempstead, Herts. HP2 6EX
Telephone: 0442 63933 Fax: 0442 231632

REVIEWS

THE GAMES PAGE

A FISHY TALE

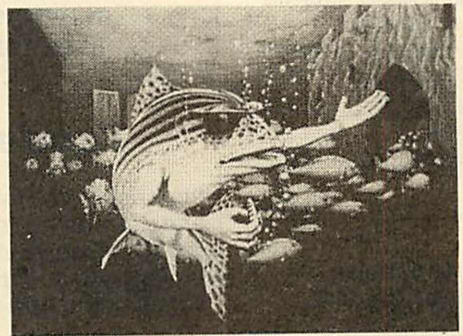
Sam Greenhill looks at what's new, and finds Minerva is hoping to sound out a new Arc game

I expect we will soon walk into shops and see some Easter eggs alongside the games. With any luck, one of them ought to be Audiogenic's BBC compilation – finally finished and expected in the shops for February. Just like the first two *Play It Again Sam* compilations, *Fab Four* boasts four strong titles. Three are sequels to *Thunderstruck*, *Pyscastria*, and the *Sphere of Destiny* respectively. The fourth is *The Omega Orb*, so *Fab Four* sounds like a good deal to me.

Arc owners with Gem Electronics' *Word Up Word Down* scrabble-type game may want to know of a hidden game 'within' the main one. Pull down the Options menu and select the smiley face. Next, go down to the bottom of the screen where the credits are given and click on the 'o' of the word 'now' with Cancel. Our thanks for this 'feature' to Keith McAlpine of Gem Electronics.

The newest addition to the games market, Impact Software, is to release its latest this month. Called *Orbital*, it is vaguely similar to *Marble Madness* in that you are a marble. The difference is that you also collect marbles and are pursued by octopuses. The game is spread over 12 levels and when you've completed them, you do them again without the marbles appearing on the map. Thus, the idea is to remember where the marbles were first time round!

One of the main features of Impact Software is its low prices, and so far all its games have been under £5, (not £10 as mentioned in January's *BBC Acorn User*). Impact's Steve Botterill, formerly of Superior, is appealing to budding new software writers out there, who have written any games. He explained that when he was at Superior, he was sent some games that weren't suitable for the £11.95 range but would be perfect for the 'under a fiver' policy of Impact. So if you've written a game and would like it published write to Steve Botterill at Impact Software, Neepsend House, 1 Percy Street, Sheffield S3 8AU.



Look out for Fish! Rainbird's wacky adventure for the Arc. You can buy the game later this month – watch these pages for a review

Grandslam, publisher of the excellent Archimedes games *Terramex* and *Pacmania* (reviewed this month) is unfortunately rather sceptical about the future in Arc games. *Pacland* is its next release but so far it's only planned for the ST and Amiga. It is basically a question of whether the Archimedes version can be squeezed into the schedule. *Hunt for Red October (Conqueror* underwater) was one game that was intended to go through the Arc conversion process, but whether we will see it or not is now down to luck and little else.

Robico of *The Hunt* and *Enthar Seven* fame, has a full agenda for adventure games. I think it's the first software house to produce a game with versions for computers right across the Acorn spectrum, excepting early machines such as the Atom. *Blood of the Mutineers* is a text-only pirate adventure for the BBC and Electron, which will also provide graphics for Arc owners. After that, sometime in the late spring, is *The Fugitive* which will probably come in the same format although the name will be changed due to copyright laws.

Minerva has almost finished another Archimedes game, this time called *ThunderMonk*. You are a ghostly monk floating over an old castle collecting objects of one sort or another. Minerva describes it as a cross between *Hoverbod* and *Repton*. Instead of firing bullets your monk casts spells. This has the supernatural advantage of being able to shoot through walls and objects! Some walls are invisible so your monk must 'grope' around while avoiding the cacti that inhabit the castle. The authors concerned with the sound in *ThunderMonk* are aiming for samples that will allow Minerva to run a 'spot the sound' competition. This would involve recognising digitised sounds that are used in the game. It was actually attempted with Minerva's *Planetoid* clone *Orion*, but some of the noises were considered too vague to be recognised and so the competition was cancelled.

However, for *ThunderMonk* the samples are being selected carefully, so watch out for this in February.

Nova Fisher of Minerva has pointed out its policy on Archimedes games. She explained that Minerva isn't a games company and it never really intended to write any in the first place. However, when people buy the Archimedes, they often want to have a few games for their kids (that's their story) so Minerva has been trying to fill the market with a few classics for business people to purchase with their machine.

Please let me know if you have any cheats or have any special methods of winning a game. Also, high scores and any suggestions should be sent to The Games Page, *BBC Acorn User*, 20-26 Brunswick Place, London N1 6DJ.

REVIEWS

GAMES

THE SPORTING LIFE



A Question of Sport; Superior Software, BBC cassette £12.95, BBC disc 5.25-inch £14.95, BBC disc 3.5-inch £19.95, Electron cassette £12.95.

BBC Television's *A Question of Sport* is hosted by David Coleman and involves two teams of sporting 'personalities'. The BBC micro version of the TV quiz is a ragged simulation, and during the six rounds it features all the famous events used in the real life game.

The game is text based, but there are 12 small portraits of possible team players, and one of your first tasks is to select two of them for your side. Then the computer or your opponent does the same, and after a couple of minor questions concerning your most knowledgeable sport, the game begins. David Coleman introduces it just like on TV, only with a scrolling speech bubble. The first round is entitled 'The Pictureboard', and selection of a square reveals an icon to represent a certain sport, and this determines the subject on which the subsequent question is asked.

The questions themselves are all multiple choice and 'spoken' by David in more scrolling speech bubbles. When he's said his bit you have about six seconds to answer – it takes almost this long to read the choices so it's a case of you either know it or you don't. The latter was most common for me, so after an unsuccessful guess the question is passed over to the other team. One thing I didn't like: correct answers aren't given when both teams fail.

I'm not the world's greatest sports genius, but I was surprised to find I doubled the computer's score in my first game. This suggested to me that it wasn't too good either. If you do buy the game, you will probably get more amusement out of it if you play against a friend. The game isn't very exciting, but it can be good fun if you know some answers. *A Question of Sport* should attract the sports fans.

Sam Greenhill

£10 LIZARDS ALIVE

Archimedes Repton 3; Superior Software, 3.5-inch disc, £19.95.

The 'Repton' character needs no introduction to Beeb games players. Now our hero has wandered onto the Archimedes and I put him through his paces.

On loading the game, you are presented with the main options just as in the BBC version. For those who have not played any of the Repton games the object is to collect diamonds from a maze. Not as easy as it sounds, as rocks, spirits and monsters are all out to take revenge.

It's disappointing that there's no difference in either gameplay or sprites between the BBC and Arc version. Although it uses one of the Arc's high resolution modes, it plays as if in mode 2 on the BBC!

Along with the original *Repton 3* screens, sets of screens for *Around the World, The Life of Repton, Repton Thru Time* and the usual screen and character editor are included. That's a total of 144 different screens with some very complex puzzles. The only additions are four tunes – and a number of bugs.

I also found the screen and character editor very unpredictable. It has a useful feature where you can test out your own screens without having to save to disc first. However, I have on occasion 'lost' all my screens and characters for no apparent reason. The transporters which take you to a different area of screen were also very hard to make use of.

Extra features included are a save position, more colours and higher resolution. If the prices of the game and the extra screens were added up on a Beeb, the price would come to £33.80. So £20 for this set and the extra features make it good value despite the annoying bugs.

Ian Boulton

£10 SMILING SNAPPERS



Archimedes Pacmania; Grandslam, 3.5-inch disc, £19.95.

Updates of bewhiskered classics seem to be the main fare on offer to Arc gamesters since companies started releasing games at all for the machine. So after *Orion* and *Fireball,* homages to the glories that were *Defender* and *Breakout,* I didn't have great hopes of *Pacmania* – an updated *Snapper*. But I was wrong!

When I loaded up the disc I was instantly hooked by the cutesy tableaux which introduce each level. But *Pacmania* doesn't just add a few fancy screens and sprites to the original; it adds a whole new dimension.

A sloping, fenced maze viewed from the side, ghosts you can jump over rather than just run away from, and best of all a jolly, bouncing Smiley Pacman. If only the soundtrack were acid house ... it's actually very acceptable disco stuff.

Pacman gulps very satisfyingly when eating any of the strawberries or stranger things which pop up. The rest of the time I can't work out whether he's mumbling 'Whip me' or 'Whitney', though I'm sure it's not important.

The game is faithful to its arcade origins. After three goes you must install more credits. A high score immortality can be achieved at the expense of lots of tedium with the up/down keys, and the demo screen says 'Game Over'.

My only complaint is that it's too easy; after only a few games I'd seen all four levels in their various coloured guises. Eventually you see them again and again in different colours and with more devious ghosts. And more levels would have been better, though that will probably be rectified by a *Pacmania* II.

Carol Atack

LIVING BY NUMBERS

There are few packages that schools can't afford not to have. Martin Phillips tells of two he believes fit this category

What makes a good piece of educational software? First it must do something useful, something that cannot be done as effectively without using a computer. The best programs are usually 'content free' – that is, they enable something to happen, but that something is not already built into the program by the programmer. The software needs to work with a wide age range – even though it's intended for a single year group. As the Cockroft Report pointed out, at the chronological age of eleven, there is a seven year spread of abilities. Finally the program needs to be easy to use, and have good supporting documentation and even other resource media. And if it is doing something very new, it needs to come with a good range of worked examples to show teachers its potential.

Real-life simulations and database software often find favour, but because it appears abstract, mathematics teaching isn't supported by as wide a range of software as some subjects.

Numerator, a new maths package from Logotron, offers an exciting way to tackle anything from simple mystery machines (teachers may remember *Jane* produced by the ITMA group) and number patterns, to investigations into probability and trigonometry. *Numerator* aims to make numbers interesting for children and easy for them to think about, discuss, and experiment with. In the process, they gain a better feel for and understanding of mathematics.

The package is supplied in a very flimsy cardboard box which will not last long in a school environment. Inside is a well produced spiral-bound manual, somewhere in size between A4 and A5, and nearly two hundred pages with a very full index. Three discs are tucked inside the manual, a most unsatisfactory arrangement. The discs are labelled the 'system' disc, a 'modules' disc and a 'walkthrough' disc. They'll work on a BBC model B, a Master or a Master Compact, and versions for the Archimedes and the Nimbus will be available soon.

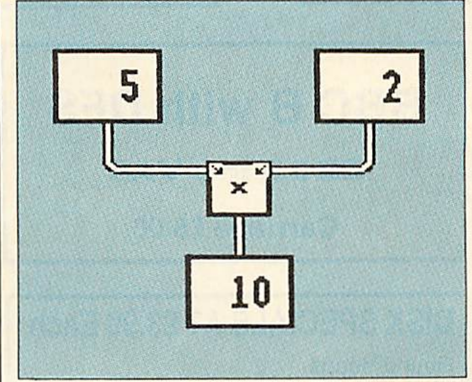


Figure 1. Numerator: easily built processors

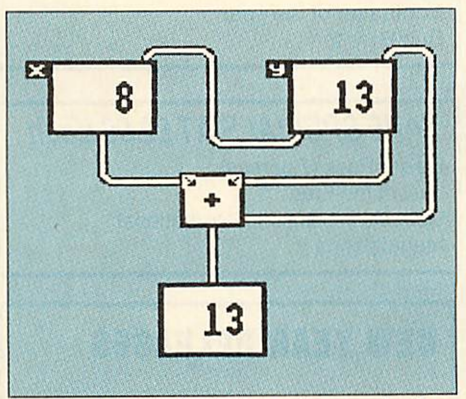


Figure 2. Graph of values can be examined

A review can't give a complete picture of *Numerator*, but the principles behind its use are quite simple. There are three sorts of boxes that can be drawn on the screen. The first is a number tank. This tank is used to input and display numbers. The next box type is a processor box: the basic operations carried out in processors can be either add, subtract, multiply, divide or stop. To link these tanks and processors, there are 'pipes'. A number tank can have one input pipe from elsewhere, or be fed with a number from the keyboard. Processor boxes have two inputs, and any number of outputs can pipe the result elsewhere. The number tanks, processors and pipes are placed on the screen by selecting them as cursors using the function keys. The cursors can be moved around the screen using the arrow keys, and they are fixed by pressing the Return key. Linking each element up with the pipes by this method is very simple: a processor which will multiply a number by two would look like the arrangement in figure 1. If you wish, text can be added to make the machine you build easier to understand.

The simple processor in figure 1 was constructed in about a minute, and that was after playing with *Numerator* for only half an hour. Numbers can be fed into one of the two number tanks at the top, and the result will be displayed in the tank at the bottom.

It is possible to feed the result from one tank back into a previous one. This is a very useful feature and is used frequently in more complex 'maths machines'. Consider the Fibonacci sequence, where each number is generated by adding the previous two numbers together with the starting numbers being given as 0 and 1. A system to generate numbers in the Fibonacci series is shown in figure 2. The 'x' and 'y' labels have been inserted so that a graph of the two values can be examined. Numbers are entered into the top of each tank and fed out at the bottom. At each cycle of the system numbers are fed into each tank from the bottom of either the other tank or the add module. At the same time the existing numbers in each tank are added together, stored in the add module and displayed in the output tank.

As well as the five basic processors, an extended set can be enabled from one of the options menus. The extensions contain greater than, less than, equal (a number is only output when both the input numbers are the same), DIV, MOD, power, AND, OR and Exclusive-OR boxes. The last three processors perform bitwise comparisons between the two inputs like AND, OR and EOR in Basic. There is also a rather weird

SUPER BARGAINS ON HARDWARE

LATEST TITLES

	Tape	Disk
Repton Thru Time	£5.50	£6.50
Saigon	£7.50	£11.95
Barbarian	£7.50	£9.95
Shark	£7.50	£9.95
Breakthrough	£7.50	£9.95
Empire Strikes Back	£7.50	£9.95
Summer Olympiad	£7.50	£11.95

LATEST FROM SUPERIOR

PLAY IT AGAIN SAM 3
PLAY IT AGAIN SAM 4
PLAY IT AGAIN SAM 5
PLAY IT AGAIN SAM 6
PIPELINE

Tape **£7.00** Each game Disk **£9.25** Each game

CURRENT TITLES	Cass	Disk
Spycat	7.50	9.95
Icarus	7.50	9.95
Tetris	6.95	9.95
Boulderdash	7.50	11.95
Indoor Sports	7.50	11.95
Quest	7.50	9.95
Play It Again Sam II	7.50	9.95
Kourtyard	7.50	9.95
Skirmish	7.50	9.95
The Lost Crystal	9.95	11.95
Spellbinder	7.50	9.95
Life of Repton	5.50	6.50
Elixir	7.50	9.95
Bonecruncher	7.50	9.95
Despatch Rider	6.00	8.95
Impact	7.50	9.95
Ransack	7.50	9.95
Ziggy	6.00	8.95
Graham Gooch Cricket	6.50	9.95
Thunderstruck II	6.50	9.95
Spy v Spy	7.50	9.95
Phantom (Tynesoft)	6.50	9.95
Winter Olympiad	7.50	12.50
Village of Lost Souls	7.50	10.50
Project Thesius	7.50	10.50
Rick Hanson Trilogy	18.00	21.00
Play It Again Sam	7.50	9.95
Spitfire 40	7.50	10.95
Palace of Magic	7.50	9.95
Crazy Rider	7.50	9.95
Codename Droid	7.50	9.95
Repton 40 Screens	5.50	6.75
Revs + 4 Tracks	10.50	12.95
Grand Prix Construction	7.50	9.95
Superior Collection Vol1	7.50	9.95
Superior Collection Vol2	7.50	9.95
Colossus Chess	7.50	12.95
The Hunt	7.50	10.95
Elite	10.50	10.95
Star Wars	7.50	10.95
Evening Star	7.50	9.95

BBC B with DFS

£255 inc VAT

Carriage £6.00

Second processor Z80 with CP/M Software Pack, Ex-demo.

£140 inc VAT

Carriage £4.00

DISK SPECIALS AT £3.99 Each

Round Heads
World War I
Psycastria
Footballer of the year
Bug Byte 2

ATS ROM from BBC soft

for Teletext adaptors (now mandatory) **£9.95**

TAPE SPECIALS AT £2.99 Each

Power Pack (7 games)
Last of the Free
Genesis project and international
Megaspsports

NEW YEAR SPECIALS

	CASS	DISK
Spitfire 40	£4.95	£4.99
Collosus Bridge	£8.50	£11.50

NEW YEAR RELEASES

	CASS	DISK
Exile	£9.50	£11.50
Repton Infinity	£9.50	£11.50
Last Ninja	£6.95	£8.95
Empire Strikes Back	£7.50	£9.95
Summer Olympiad	£7.50	£11.95

EX DEMO

Master 128's
+ free software pack
(limited supply)

£320 + £5 carriage

ACORN SPEECH UPGRADE KITS BBC/B+

OUR PRICE

£19.95

New release

Question of Sport

(from Superior)

Disk £11.50 Cassette £9.50

TOWERHILL COMPUTERS LTD



Unit 5, Acacia Close,
Cherry Court Way Ind Est, Leighton Buzzard, Bedfordshire
Telephone: Leighton Buzzard (0525) 385329/383074

VISA

ALL PRICES INCLUDE V.A.T. AND P&P. OVERSEAS ORDERS ADD £2.00

function called a 'junction', which outputs the left side input if there is one, or the right input if there's no lefthand number. The use for this junction process is illustrated in the standard deviation machine (see figure 3). For a complex machine like this, you could run out of room on screen, but you can scroll the screen left, right, up and down to allow your construction to grow.

The final type of box is a module. A module is a previously-assembled machine that has been saved to disc (the black box approach). Thus it is possible to devise a series of mathematical building bricks, each carrying out a separate process, which can then be linked to form a more complex machine. Up to six modules can be stored in memory at any one time. This facility makes *Numerator* very versatile. The building bricks present tremendous scope for investigative work in mathematics. As well as entering single numbers and waiting to see the result, you could build an increment module which you make count from any starting point to any stop point with a given step rate. Add this to any new machine and it can sequence automatically. The speed can be set to fast or slow or single step. Slow rate is one process per second – you could even use this fact to build a clock!

Numerator also has graphing and printing facilities. Both of these are simple to use, and it is possible to graph or print at any time. The print facility will print the whole of the machine you're working on, even though much of the work may be off the screen. It is also possible to chart the results of a process.

Author Peter Hunter ensured that *Numerator* links to some of the BBC micro's other features. It can support a Concept keyboard, or use a mouse as an alternative to the cursor keys. It can take data from the BBC's user and analogue ports and act as a data logger.

The documentation is presented in an unusual way. First there is a long tutorial walkthrough, then a reference section, and finally a series of classroom case studies. It is the walkthrough part which is unusual: this takes you step by step through each facet of the program, and processors used as examples are stored

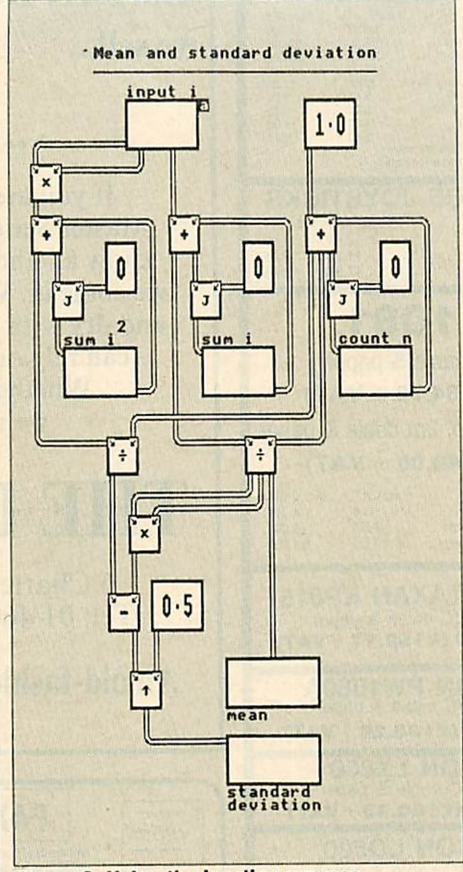


Figure 3. Using the junction process

on the walkthrough disc. It makes an ideal introduction to the program.

There are very few programs that I find really innovative. But *Numerator* is one of these. Eventually, I am sure it will become one of the educational computing 'classics'. Few schools could justify not having a copy! As a program it is not easy to describe: perhaps the best definition is that it does for numbers what a wordprocessor does for text. Logotron calls it a 'mathematical construction kit'. It meets a classroom need that is difficult to do in any other way, and author Peter Hunter deserves commendation for such a superb program.

I can only describe *Numerator* as brilliant. To me this is what educational computing is all about – as an investigative tool for mathematics it is without parallel. It is superbly programmed, and has an excellent handbook together with useful supporting material. My only concerns are the terrible packaging, and the price of about £35 which is rather high for schools, even for a program of this quality.

Geometrix

Geometrix is published by Cambridge Educational Software, and is the first fruit of programming company European Educational Software. It is described as a geometric calculator. Essentially it is able to construct a range of drawings to given dimensions, and then take accurate measurements from these drawings.

Its main use will be with mathematics, but it could be used in any area of the curriculum where problems can be solved by accurate geometrical construction and precise measurements. I could also see the program being valuable for special needs, especially for youngsters whose physical handicap prevents normal access to the curriculum.

Geometrix is supplied on a single 80-track, double-sided ADFS disc for the Master 128 only. This is not unreasonable, as I suspect few secondary schools are now without at least one Master. There is a well written A4 loose-leaf handbook together with a set of workcards and an A5 student starter guide. One minor criticism of the documentation is the lack of background detail supplied – for instance the only place where it says the disc is ADFS is on the front cover of the A4 folder. *Geometrix* can be used with either a mouse or the cursor keys and 'quick keys'. The AMX or Watford's excellent mouse worked perfectly. The quick keys are a good idea if you have to rely on the cursor keys.

The thing that always infuriates me is having to leave the drawing area to move across to point at an icon and then return to the drawing area. By using the quick keys, you don't need to move to the icons; it can be accomplished by a single keypress instead.

Essentially the program is operated by using a ruler on the screen. This is a line with a cross at one end and a circle at the other. The ruler can be moved about the screen by pointing to the cross, and altered in shape and orientation by pointing to the circle.

Geometrix initially looks hostile and deceptively simple as an educational tool, but it should be of considerable value in some curriculum areas. It has the double merits of being simple to use, logical, and yet very flexible.

EPROMS, 8271

	Exc VAT	Inc VAT
1-9 27128 250nsS 21V	4.30	4.95
10+ 27128 250nS 21V	3.87	4.45
1-9 27128 250nS 12.5V	3.22	3.70
10+ 27128 250nS 12.5V	2.91	3.35
1-9 2764 250nS	2.60	2.99
1-9 27256 250nS	4.22	4.85
10+ 27256 250nS	3.83	4.40
1-9 TTL/Cmos set	3.91	4.50
1-9 8271 controller	39.13	45.00
1-9 6264 LP 150nS	8.00	9.20
Acorn 8271 DFS	45.22	52.00
Acorn 1770 DFS	45.22	52.00

ROMS

	Exc VAT	Inc VAT
Inter-Word	35.65	41.00
Inter-Sheet	35.65	41.00
Inter-Base	46.96	54.00
Wordwise Plus	37.39	43.00
MEGA 3	71.30	82.00
Spell Master	40.00	46.00
View Spell	40.00	29.90
View Plot Disc	19.13	22.00
ViewSheet	36.52	42.00
View Store	36.52	42.00
Overview I & II	68.70	79.00
View Professional	58.26	67.00

MONITORS

	Exc VAT	Inc VAT
Philips CM8802	173.04	199.00
Philips CM8852	251.30	289.00
Philips BM7502 Green	65.22	75.00
Philips BM Stand	7.78	8.95
Philips TV Tuner	56.52	65.00
Taxan KX P31 Green	68.70	79.00
Taxan KX1201 (Green/p 39)	60.00	69.00
Taxan KX Amber	82.61	95.00
Microvitec 1451	221.74	255.00

(Prices inc. BBC Cable)

MASTER/ARCH

	Exc VAT	Inc VAT
Master 128K Micro	365.22	420.00
Archimedes 305 from	669.00	803.35
Master Compacts from	294.78	339.00
Turbo Upgrade	98.78	113.50
A.R.M. Assembly Lang. Book	12.00	12.00
Care cartridges from	8.65	9.95
View 3 View Sheet guides	9.00	9.00
Reference Manuals	14.00	14.00
Master & BBC Dust Covers	3.00	3.45

Second user BBC Bs available
Phone for details

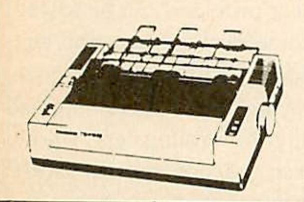
PHILIPS CM8833

with BBC cable
£225.00 (£195.65 + VAT)

VOLTMACE JOYSTICKS

	Exc VAT	Inc VAT
Delta 14B single	12.61	14.50
Delta 3B single	11.26	12.95
Delta 3B twin	17.35	19.95

PANASONIC KXP 1081



with BBC cable & paper
£155.00 (£134.78 + VAT)
with Screen Dump, 2m cable & paper
£161.00 (£140.00 + VAT)

	Exc VAT	Inc VAT
KXP Fabric Ink ribbon	3.74	4.30
KXP View Printer driver	7.83	9.00
KXP Control Dump rom	13.00	14.95

CITIZEN 180E

with BBC cable & paper
£158.00 (£137.39 + VAT)

KAGA/TAXAN KP815

with BBC cable & paper
£175.00 (£152.17 + VAT)

CITIZEN 120D

with BBC cable & paper
£135.00 (£117.39 + VAT)

CANON PW1080A

with BBC cable & paper
£159.00 (£138.26 + VAT)

STAR LC10

with BBC cable & paper
£205.00 (£178.26+VAT)

EPSON LX800

with BBC cable & paper
£219.00 (£190.43 + VAT)

STAR LC10 COLOUR

with BBC cable & paper
£195.00 (£169.56 + VAT)

EPSON LQ500

with BBC cable & paper
£315.00 (£273.91 + VAT)

STAR LC2410

with BBC cable & paper
£325.00 (£282.61 + VAT)

EPSON FX800

with BBC cable & paper
£339.00 (294.78 + VAT)

CANON A55 (17")

with BBC cable & paper
£315.00 (£273.91 + VAT)

PRINTER RIBBONS

	Exc VAT	Inc VAT
LX800 & FX800 Print Ribbon	2.30	2.65
LX-80 Print Ribbon	2.13	2.45
NL-10 Print Ribbon	4.80	5.52
LC-10 Print Ribbon	4.00	4.60
1200 Print Ribbon	4.00	4.60
KP/PW Print Ribbon	3.22	3.70
Juki 6100 Print Ribbon	1.30	1.50

Phone for quantity discounts

PRINTERS/CABLES/ETC.

	Exc VAT	Inc VAT
Epson LX86	112.71	129.00
Star NL 10	164.45	189.00
MP480 (480cps)	260.00	299.00
1.5m (4 foot) BBC Cable	4.00	4.60
2.0m (6 foot)	6.00	6.90
Compact printer cable	6.00	6.90
IBM Archimedes cable	6.00	6.90
LX800 Sheet Feeder	62.61	72.00
LC10/LC2410	56.52	65.00
NL 10 Sheet Feeder	47.83	55.00
2 way printer switch	18.00	20.70
Printer Dust Covers	4.00	4.60

DISKETTES 100% error free

(lifetime warranty)

	Exc VAT	Inc VAT
10 Banana Reversible disks	8.65	9.95
10 3.5 D S tpi	8.61	9.90
10 96tpi D S D D + case	6.04	6.95
10 96tpi D S D D in box	5.17	5.95
50 96tpi D S D D in boxes	17.17	19.75
100 96tpi D S D D in boxes	32.09	36.90
40 Disc Box 3.5" + lock	5.17	5.95
50 Disc Box hinge lock	5.65	6.50
100 Disc Box hinge lock	6.52	7.50
Black Library case	1.21	1.39

5¼ DISC DRIVES

	Exc VAT	Inc VAT
Cumana CSX100	90.43	104.00
Cumana CSX400 40/80T	117.39	135.00
Cumana CD800S 40/80T	252.17	290.00
MD400A 400k No PSU 40/80T	85.22	98.00
MD400B 400k & PSU 40/80T	100.87	116.00
MD802C 800k No PSU 40/80T	173.04	199.00
MD802E 800k & PSU 40/80T	190.43	219.00
MD802D 800k – Stand 40/80T	204.35	235.00

Phone for Viglen & Torch Winchesters

Phone for our best price before placing your order
EDUCATIONAL & GOVERNMENT ORDERS WELCOME
All products have a 12 month no quibble guarantee
Prices subject to variation without prior notification
We are closed Saturday afternoons
Carriage 92p (80p + VAT) Securicor £6.90 (£6.00 + VAT)



Acorn Dept.
128 West Street,
Portchester,
Hants.
PO16 9XE.
Tel: 0705 325354

FREE



with every computer we sell...



...our expertise!

If you are buying a new Archimedes or Master Series computer, you don't expect to know all about it from day one. That's where we come in. We don't leave our customers high and dry with their problems — they know they can rely on us to get them out of trouble. Whether it's hardware or software, we're the people who know.

THE DATA STORE

6 Chatterton Road, Bromley, Kent
Tel: 01 460 8991 Fax: 01 313 0400

An old-fashioned *specialist* computer shop

FAX*FILE ORGANISER



Combine the power of your BBC with the flexibility and convenience of a personal organiser (Filofax, Lefax etc) to create a personalised data base. Using special sized computer paper or single sheets to print:

★ Diaries including your data (on disc).
★ Address book pages, up to 48 entries sorted by name.
★ Custom designed forms.

The program is menu driven with plenty of on-screen help. The graphics are superb and the printed pages will match the high quality of your personalised organiser.
The Organiser will run on a BBC B or a Master 128. It requires an Epson FX80 compatible printer. Extra computer paper (tractor feed, pre-punched) is available.

'Simple but effective product, very easy to use' Acorn User
'Extremely friendly, I cannot fault it' Beebug
'I have no reservations about recommending this product' Micro User

£12.95 inc p&p

Disc, 40/80 track (state which), manual, sample pack of paper

MEWsoft's — A4 FORMS DESIGNER
'A cheap and effective program' Acorn User Sept '88
Ideal for schools, clubs, and for invoices, membership forms etc.
Master/Compact, Model B with Shadow Ram £9.95, Archimedes £12.95

Latest fancy label printer, send for details
MEWsoft
11 Cressy Road, London NW3 2NB. Tel: 01-267 2642

TRADE IN YOUR BBC B AGAINST ANY MICRO OF YOUR CHOICE

We will offer £150 or more for any working BBC B against the following micros:

Acorn Master 128	£454
Acorn Archimedes	from £800
Atari 520STFM	Superpack £399
Atari 1040STFM	£499
Commodore Amiga A500	£399
Amstrad PCW's from	£401.35
Amstrad PC's from	£458.85

or any other popular micro
Retail shop open 6 days 9.30am-5.30pm
Portobello Trading Company
300-302 Portobello High Street,
Edinburgh EH15 2AS
Tel: 031 657 3941 (3 lines)



WET, WET, WET

Will you put more money into replacing those Victorian sewers, or go for the building of a new sewage works...? Dave Futcher finds out

If you become a shareholder in a privatised regional water authority, you'll be interested in how these massive institutions are run and how they perform. The value of your shares and dividends will depend on how well the authority is managed.

Water Manager is aimed primarily at the educational market. But Cambridgeshire Software House has produced it for anyone who might be interested in the running of a water authority.

All teachers acknowledge that it is best to give children first hand experience whenever possible. But it can be too dangerous, too expensive, too difficult or too time consuming. Computer simulation may be the answer. Cambridgeshire Software House produced *Water Manager*, especially for environmental and science work, but with application in economics and business studies too.

Water Manager is about supplying the water services to a town and village. This includes ensuring that the reservoir is kept as full as possible without depriving the downstream towns of water. Mains have to be repaired and replaced and sewage treatment has to be thought of.

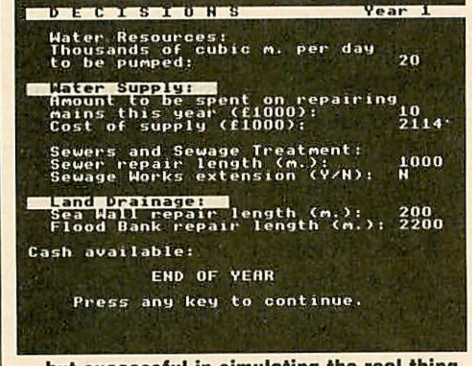
You can't make decisions unless you have information. *Water Manager* provides this in the form of a series of information pages that can be called from the main program menu. These inform you about the water cycle, water resources, supply, sewage and land drainage. Although brief, this gives you basic information which should enable you to get plenty from the program without turning to reference material.

Once you are in charge of the water authority you have a whole series of situation reports at your disposal.

These reports are available while you make the necessary investment decisions that the simulation requires. Four separate reports are available, on resources, water supply, sewers and sewage treatment and land drainage. Each of these reports



Water Manager: Not enough illustrations...



...but successful in simulating the real thing

provide essential information, clearly displayed using a mode 7 screen.

The Resources report tells you how much water is available in the river, how much needs to be left for use downstream, how full the reservoir is, its capacity, and the annual cost of pumping 1000 cubic metres per day into it. The Supply report informs you of the consumption of your area, the amount of water being lost through burst pipes and the cost of pumping a cubic metre of water a day to both the town and the village.

There are six investment decisions to be made each year in *Water Manager*. You have to decide on the amount of water to be pumped each year, the sum of money to be spent on repairing the water mains, and the length of sewers to be repaired. You also have to decide whether to extend the sewage works or not, whether the sea wall needs repair, and the length of flood bank to be repaired. You've got £6 million to allocate to these jobs. To get the money, you can increase the water rates or borrow extra money from the government.

It's worth remembering that there is a limit to the increase in rates that the public will accept, and that the government may well refuse to loan more cash.

As in real life, running a water authority is not just a question of providing all the customers with their supplies and balancing the books. In *Water Manager* there are various unpredictable elements. For instance, will the weather be so good that there's a drought. When there's a flood, you'll find out whether the river levees are adequate and there are dire warnings about the condition of the sewers.

If your planning and decision making is seriously awry a calamity will be signalled and the game ends. This is well handled, as an explanation of where you went wrong and what the consequences were are given.

There is no doubt that *Water Manager* will enhance your understanding of the role of a water authority. It is actually a joint venture between CSH and Anglia Water, and the contribution from the experts definitely shows.

The software is easy to use and self explanatory. It is supplied with a 15-page A5 booklet which provides lots of very suitable follow-up activities, including some linked science experiments. The package of small posters and pamphlets from the Anglia water authority will save many busy teachers from finding their own material.

Teachers and pupils who used the package over half a term linked with an environmental and scientific study of water found it to be a realistic and extremely comprehensive simulation.

I believe *Water Manager* will be extremely valuable for cross curriculur use in secondary education. And I'm sure some shareholders will find it fun too.

SOFTWARE

ROBOBOD

Will the automaton be an essential part of the future? Sam and Richard Greenhill look at a package that they believe makes building robots easier

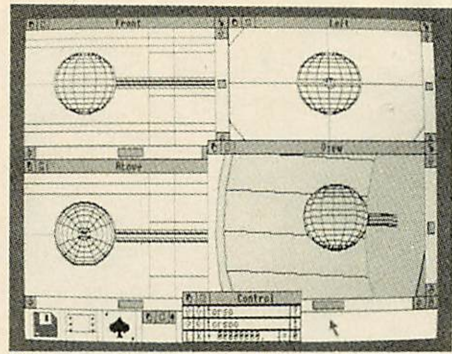
Building a humanoid robot is no easy task – but this is the objective of a group of dedicated eccentrics in North London. There are a dozen or more people involved, and a handful of them meet every Wednesday at a workshop where they work on the machine.

The robot, called Shadow, will ultimately be able to perform most tasks that a human can do. The group still have a long way to go, but one way to stay on target is to model the robot as closely as possible on the one thing we all know works – the human body.

The present concern is the legs – work progresses on a basic frame for the robot while software writers hammer away at keyboards in the background. They are preparing for a proto-type to test their programs, but the hardware team may keep them waiting.

It is difficult to visualise, exactly where muscles should be positioned on the leg and how to shape the leg to house them perfectly. So far, the only way to do this has been trial and error fiddling – but this is tedious and time-consuming. Looking at drawings doesn't help, as they are only two dimensional, and they can't be manipulated unless someone extremely handy with a pencil and rubber is available. What the group needed was a method of displaying the legs in three dimensions, with the power to portray them with as much reality as possible.

Ace Computing is fairly new on the Acorn market, but its first product for the Archimedes looked like a solution to the group's problem. It's a three dimensional drawing package called *Euclid*. It comes in the form of an Arc relocatable module, and like a number of products packaged in this way, it has an example program to demonstrate the commands on offer. In fact it has a number of example programs but the one that does the business is called *ECdesign*. That's the one we put to the test with our robot-designing gang.



Spheres and cylinders used to create legs

The manual

The first thing to say is that you shouldn't expect to pop in the disc and go. *Euclid* is a complicated package, made no simpler by the manual. The best idea is to collect as many technically minded people as you can, and then sit down together to figure it out.

Before resorting to the guide, we managed to get exactly nowhere, and after consulting the manual we became more confused than ever. The main problem is the omission of a simple tutorial section. There is a part that describes, fairly adequately, how to manipulate an example object supplied on the disc, but it never explains how to start from scratch.

It took us several attempts before we managed to create a single shape. When we had finally done this, we wanted to add some reality. Colour in the index refers to a small paragraph near the beginning of the book: 'Changing values in the control box is usually self explanatory, except perhaps for colour. Colours can be given in any mode! *Euclid* simply does its best to represent the colour you require.' Then it talks about the 16 available shades for red, blue and green. After this it suggests 'Try colouring in the object.' It doesn't say where to enter the variables for red, green and blue, or how, and what figures to use and why. Apparently, when Risc OS is officially released in April, the manual will be completely rewritten to cater for the new Risc OS version of *Euclid*.

ECdesign

ECdesign uses the Arc's windows, icons, menus and the mouse. It gives different views of the object currently being edited: an overall view of the scene in 3-D and colour is displayed in a window called View, while side and front elevations plus plan views can be selected. There are also nine other 'cameras' available – alternative views, which can be positioned anywhere to observe the scene from any angle. You can also place cameras on the object itself, so when you move it the angle of view isn't altered. The elevation and plan views are wire-frame, and look very professional.

The models created using *Euclid* consist of objects, planes and prisms, which are arranged in a hierarchical tree structure. You can't see the whole structure, just the part you are 'in'. This is shown in a small control box with 12 sections to it. Clicking the mouse on various icons takes you up and down levels, across levels, and sets a host of possible values for scale, rotation, location and colour. And that's just for one axis – x, y and z are all separate.

Like a filing system, $. is the top of the tree and represents the entire scene. While looking at the current level, it and everything below it in the tree can all be rotated or moved. Four slots in the control box are allocated to directional arrows, and clicking on the left and right ones move through the nodes contained in a horizontal level of the tree, while up and down arrows move between levels. The diagram opposite shows a simple version of Shadow's legs structure.

Euclid supports two types of building brick – solids and landscapes. The former uses planes, and for example when building a cube, the user would literally place the square sides on one by one like a cardboard box.

The other way is to create what Ace calls a landscape, which uses 'vanes' to construct a shape. A vane is similar to a plane, but is a 'slice' across the object – lots of slices are used to build a shape. So it is possible to build a simple shape with only two vanes, one defining the top and one the bottom. The surfaces in between are automatically created.

One of the panels in the Control Box (*Euclid* ought to indicate which one!) displays the name of the object, vane, plane or point you are currently working on. At the same time a 'blob' marks the object itself in the orthogonal views, so the item currently being edited is known as the 'blobbed' object. When Right Leg, for instance, is the blobbed object, it can be moved or rotated without affecting the rest of the body. One bad point about this system is that when the blobbed object is below another in the tree, the 'parent object' is invisible. For example, if you wanted to draw the foot in place in the ankle slot, you would have to physically measure the position of the ankle in relation to the edge of the monitor, then go down a level and use your measurements to create the foot.

Another criticism of the *Euclid* tree system is that inserting levels between two existing ones doesn't seem to be possible without first saving the model, clearing the memory, creating a new object, saving it, loading the model back in, appending the new object, and finally inserting it in the desired position.

Input

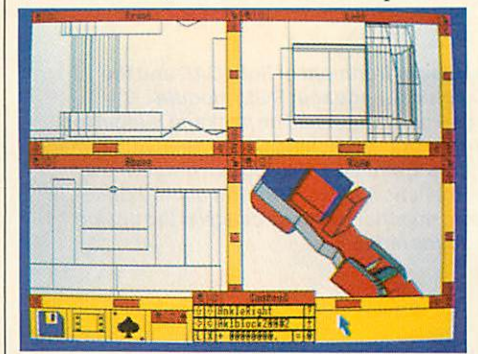
Each point on each plane or vane has three co-ordinates, x, y and z. By default, y is the vertical axis and z the 'depth' axis, though this is fairly easy to change if you feel z ought to be 'up' (alter a line near the beginning of the *ECdesign* program). Entering co-ordinates can be done by typing in the figures, or by dragging the objects into place with the mouse. The latter method gives only coarse control, and almost immediately we chose the type-in option. In creating Shadow's legs, solid objects such as the pelvic girdle were needed. The only way to build this appeared to be to type in all the co-ordinates three times – once for each of the three planes that meet at the corner of an object.

Happily, another method is available, in the form of a separate Basic program. This generates a simple solid, and it was easy to adapt our own shapes. The co-ordinates are typed in only once, and the colouring is a lot easier. When all the different objects have been defined, the program is run and the shapes are automatically assembled. Then you save them to disc and append them into *ECdesign*. The leg frame was finished much faster using this method. Once in *ECdesign*, the assembled parts could be put together using a sensible hierachy.

As the leg was gradually built up from the different elements, the display took longer and longer to draw, and by the time the toe positions needed adjusting, it was infuriatingly slow. Even so, it is probably faster than similar applications on other micros.

Corners and curves

The *Euclid* disc has a number of generator programs like the one for solids. Two were used for creating spheres and cylinders for various parts of the leg. It is not really possible to have a proper cylinder or curve – the computer deals with them as a series of planes. This incurs a big speed penalty. Holes are also impossible – to put a hole in something, you must define the shape with the hole catered for.

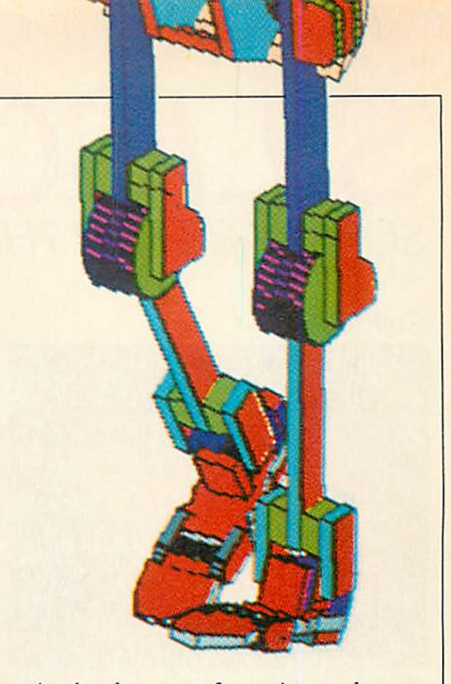


Tree structure for Shadow's legs

That's to say, when telling *Euclid* how many sides a shape has, the sides of the hole must be taken into account. Then the corners can be dragged into the shape of the hole. But you're still left with a 'saw-cut' edge leading from the hole to the side of the shape. If you want a circular hole, this obviously makes things more complicated.

Displaying

Once you have created a scene, there are a number of ways to display it. You can use the *ECdesign* program and spend some time positioning cameras, using the mouse to rotate and zoom images. This feature was not available on earlier versions of *Euclid*, and the user had to



type in the degrees of rotation and zoom. Now using either Select or Adjust buttons on the mouse makes it much easier. However, it's still not as easy as you would think.

The program applies what must be a very strange algorithm to the mouse interpretations, and there is an unnecessary amount of difficulty in rotating or zooming. Even with practice you won't be able to master it quickly.

Another method of displaying the scene is to write your own program, accessing commands from the *Euclid* module. But the best way to display the scene is to load it into the *Fly* program. This is a beautiful example of how computers can really help design work – it certainly helped us. Using the mouse and the cursor keys, you can 'fly' around your object, viewing it from any position. And this is the pay off – screen shots are no substitute. It really has to be experienced to be believed!

Conclusion

There are still a few bugs in the program, which we hope will be cleared up before the Risc OS version arrives. These include inexplicable errors popping up saying 'vane sizes don't match' or such like. But a nice touch built in to *Euclid* is that if a big error occurs, you have the option to save your masterpiece before the computer collapses.

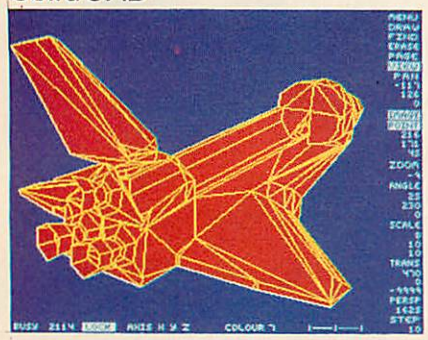
There is no doubt that *Euclid* is helping in the design of the Shadow robot, and by having an exact replica on the screen and taking measurements using the mouse, muscles can be placed wherever they are needed.

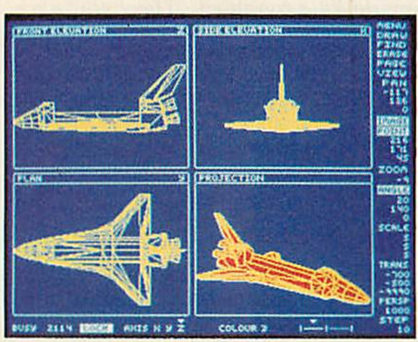
Euclid does have its faults – most of them in the manual – but overall it is a very smart piece of software. We would certainly recommend it to anyone interested in this field.

SILICON VISION

SOFTWARE FOR THE ARCHIMEDES & BBC

SolidCAD





The ultimate 3D Draughting System for Architectural design, Interior design, Engineering Design and Teaching CDT. Allows drawing in plan, front & side elevations and also directly in 3D view. Includes powerful zoom & pan options for precision draughting and surface definition for creating solid colour objects. Also includes Sweep, Extrude & Macro facilities for designing very complex objects easily. Designs created with SolidCAD are compatible with the Realtime Graphics Language for high-speed flicker-free animation. The custom Archimedes version also performs smooth shading for realism. SolidCAD(Arc) users can upgrade to the Realtime Solids Modeller (Arc) for £40.00.

£49.95 (ARC or BBC B/B+/Master), New

REALTIME SOLIDS MODELLER

The package includes both the sophisticated design environment of SolidCAD and the high speed animation capability of a Realtime Graphics Language (RGL) module developed in pure ARM Risc code for supercharged performance. The package is ideal for Architectural design, Interior design, Engineering design & teaching CDT. The RGL module can be used to create standalone flicker-free animation of designs from your own programs. Smooth shading is also performed for realistic images. Through our in-house expertise in 3D Design and High-speed techniques, no other package can rival the design environment & animation speed of the Realtime Solids Modeller.

£89.95 (ARC) New

REALTIME GRAPHICS LANGUAGE

The Realtime Graphics Language rom provides a complete 3D Solids/Wireframe animation system with 52 star commands and 3D Editors for designing objects to animate from your own programs. Includes a 35,000 pixels / sec line generator for fast 3D drawing rates, 3D Rotate, Scale, Orbit, Perspective and Turtlegraphics. Also compatible with designs created with SolidCAD (BBC).

£49.95 (BBC B/B+/Master)

SUPER-DUMP

The ultimate printer driver which takes advantage of the highest resolution capability of ordinary Epson compatible printers to provide 1920×1024 resolution. Images can also be scaled, positioned and previewed before printing. Fully compatible with SolidCAD, Realtime Graphics Language, Gate-Array design system & 3D CAD/Animation system. Your own graphics programs or other CAD packages can be made compatible with Super-Dump by the addition of a few simple commands. An example program is included in the package.

£15.95 (BBC B/B+/Master), £24.95 (ARC) New

Presentation System

The package provides an interactive environment to create, edit and play-back computer controlled presentations for lectures and demonstrations. Also handles graph plotting for polynomials & user-defined functions which can be incorporated within the presentations.

£34.95 (BBC B/B+/Master), £49.95 (ARC) New

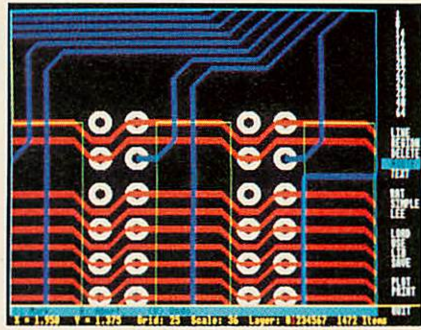
All Archimedes software run in native mode on A305 – A440

SILICON VISION LTD, SIGNAL HOUSE, LYON ROAD, HARROW MIDDLESEX HA1 2AG. TEL: 01-422 2274 or 01-861 2173 FAX: 01-427 5169. TELEX: 918266 SIGNAL G.

(Access/Mastercard/Eurocard accepted)

All prices include VAT and Carriage (Overseas orders add £4).

ARC-PCB



The ultimate PCB design system developed specifically for the Archimedes with a specification that cannot be matched. Includes Automatic routing, Rats-nesting, 8 layers, Surface mount capability, 0.001" resolution, 32"×32" maximum board size, On-line Help, Fast Zoom/Pan/Redraw, Text & Silkscreen facility, Variable Line/Pad/Text/Grid sizes, Part Libraries, Block Move/Copy/Rotate/Mirror/Erase options, and up to 300,000 components.

For hardcopy, the system supports the industry standard HP-GL, GRAPHTEC, PLOTMATE plotters and printers at their highest resolutions. Also provides automatic drilling information with extensive support from PCB manufacturers for final layout and production, optional 1 year telephone Hotline support (£100) and software maintenance service (£75) is also available.

£195.00 (ARC) New

Risc BASIC

The first true BASIC V syntax compiler which will convert your programs into supercharged Risc code for turbo performance leaving the competition standing. Features include Relocatable modules, full cross references, Double precision floating point & Integer support, in-line assembly, Window-based or command line compilation environment, standalone code generator, object code optimiser, full array manipulation and dimensions support, multiple exit structures & full runtime error handler.

£99.95 (ARC) New

RiscFORTH

A new 32-bit implementation of the FORTH-83 standard, designed to take full advantage of the ARM architecture. Features include Multi-tasking, Optimising compiler, built-in ARM assembler with floating point mnemonics, built-in Full screen Editor, File system interface, OS calls support, Floating point & Integer maths, WIMP support, Single-step debugger, Shadow screen for documentation, Block manipulation, Dictionary & Vocabulary display, Call finding and a standalone code generator.

£99.95 (ARC) New

CONNECT MORE

Dr Christopher Dobbing looked at Amstrad's new modem and found it was good but difficult to use with Acorn computers

The Amstrad SM2400 is a stand-alone version of its highly acclaimed MC2400 modem card for the IBM PC. At £286 it must be the cheapest BABT approved V22bis (2400/2400 baud) Hayes-compatible modem on the market, and this would seem to make it an attractive proposition for any Acorn users who would like to get more involved in high speed communications.

Unfortunately things are not always what they seem. There are problems using this modem with the model B or Master and Archimedes computers. In fairness the problems are not entirely due to the design of the modem, but they are, nonetheless, important.

The modem is in a slim plastic case designed to fit under a telephone, and has an array of nine red LEDs on the front. With so many indicators it isn't always easy to see exactly what is happening – I would have found it useful for some of the functions to have had different coloured LEDs. It would then be obvious at a glance, for instance, that the modem was on-line with no data carrier detected, without having to check the tiny lettering under each LED.

There are three sockets on the back of the modem; a standard RS232 25-pin D socket, a phone socket to connect a normal phone handset, and a power supply socket. Adequate 'bell tinkle' suppression means that even phones wired in parallel with the modem don't chatter when the modem is pulse dialling – an annoying feature of some much more expensive modems.

The separate power supply is a surprisingly hefty unit, not just a transformer on the back of a plug. The phone cable is three metres long and terminates in a standard BT phone plug. A standard RS232 cable with 25-way D plug and socket is provided, but this will be of no use to Acorn users.

The printed circuit board looks well designed and constructed and the modem does not overheat even if left on constantly in auto-answer mode. There is no reset button. Purists will say this is unnecessary in a smart modem, as resetting is possible under software control. In fact I found it a disadvantage as the modem can 'hang up' and ignore commands until a default period of about one minute has elapsed. All you can do then is wait or power it down and up again, which is much less elegant than pressing a button. An adequate manual gives full details of all the Hayes-type commands that are supported.



Amstrad SM2400: good value but it takes time and patience to get it to work properly

There is an internal loudspeaker so that you can monitor the progress of a call. I find this very useful but, if you prefer, it is possible to turn it off under software control.

Using the modem

In use the modem performed well, and I had no problems with line noise, even at 2400 baud, to bulletin boards where line noise sometimes makes communication virtually impossible. The modem coped with tone and pulse dialling on direct lines and PABX systems. Inserting a W in the dial string causes the modem to wait for the presence of a second dial tone before proceeding, useful where you have to dial 9 for an outside line.

A serious drawback with this modem is the difficulty it has coping with Prestel-standard (1200/75 baud) operation. The modem can't communicate with the computer at a split baud rate (1200 in and 75 out), and so it is necessary to set your computer serial port to 1200/1200 and then send a command to the modem to buffer the 75 baud data stream. This is explained in the manual and the procedure works well once you've got the hang of it.

Your software may allow you to put the relevant command in your dial string. If you can't, and are a frequent user of Prestel-style systems, you will find this a bit of a chore.

The same problem occurs in auto-answer mode – the modem can adjust

OFFERS

STOP PRESS AND SUPERART



For a short time only, *BBC Acorn User* magazine has organised a sale of AMS *Stop Press* and *SuperArt* for our readers.

Stop Press puts you right at the heart of the desktop publishing revolution. Create professional newsletters, leaflets, flyers, forms or anything that needs graphics and text. The package is ideal for home enthusiasts, schools, societies and small businesses.

Stop Press comes on two 16k ROMs and two discs for the BBC, and three for the Master. The package includes: 16 typefaces as standard; keyboard; joystick and mouse control; user definable fonts, text editing and formatting; cut and paste facilities; graphics, drawing and painting; comprehensive dumping routines and a mode-screen converter.

Text can be entered from within *Stop Press*. Alternatively, it can be imported from your preferred wordprocessor. The package is a real bargain at £34.99 without mouse and only £49.99 with the AMX mouse – a saving of £30.

SuperArt is widely acknowledged as the most sophisticated, yet easy-to-use paint package available for the BBC B, B+, Master 128 and Master Compact. Its features include: cut, copy, paste, move, rotate plus many more, such as fantastic spray and zoom facilities.

Now you can have it all by taking advantage of our special package of *SuperArt* with *Stop Press* and mouse for only £84.98, a saving of £45.

Please send me

________ *copies of* Stop Press *at £34.99*

________ *copies of* Stop Press *and Mouse £49.99*

________ *copies of* Stop Press, *Mouse and* Super Art *£84.98*

My computer is a ________

I enclose my cheque/postal order for £ ________ *made payable to* **AMS Ltd.**

Please charge my Access/Barclaycard

Acc No ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ *EXPIRY DATE* ☐☐☐☐

Signed ________ *Date* ________

Name ________

Address ________

________ *Postcode* ________

Send this coupon with your remittance to Stop Press Sale Offer, **Redwood Publishing Ltd, 20-26 Brunswick Place, London N1 6DJ.**

very nimbly to the baud rate of the incoming call if it is V21, V22 or V22bis, but falls over if confronted with an incoming V23 signal. This will pose a big problem for those wishing to operate a multi-baud rate bulletin board.

There may be a way round it, but I couldn't find it – and Amstrad's technical help line was always engaged or unanswered when I tried.

Connecting up

Now for connecting the modem to your BBC B or Master. Although the SM2400's serial socket only uses eight of the 25 pins, and only six connections are needed to work in most conditions, your computer's serial port only has five lines. You will need to make up a lead as shown in figures 1 and 2. Figure 1 shows the two connecting plugs and sockets. The view in the diagram is of the rear – wiring side – of the plug. You of course get the same view looking into the computer's or modem's socket. The only real problem is that the plug for the BBC micro's serial port can be plugged in two different ways: the best 'fix' is to mark the 'top' of the plug with white paint before you start soldering it together. It doesn't matter which way up it is at that stage, but once you're marked the top, always plug it in with the white mark uppermost.

The modem will still not work unless the Data Terminal Ready pin 20 is maintained high (at 5 volts). There is both a software and a hardware solution to this problem. You can use a Hayes-type command to tell the modem to ignore the DTR line. This works up to a point, but is unsatisfactory in V21 and V23 modes. The alternative is to connect pin 20 permanently to a +5 volts supply. Unfortunately, though many modems provide +5 volts on pin 9 of the RS232 socket for just this purpose, the Amstrad SM2400 does not.

I had to take the +5 volts from pin 1 of the analogue input socket on the computer – a functional but inelegant solution. With this modification the modem worked well with BBC Soft's *Modem Master* software, using the Hayes modem driver. Other V22 modems, for example, the Miracle WS3000, cope

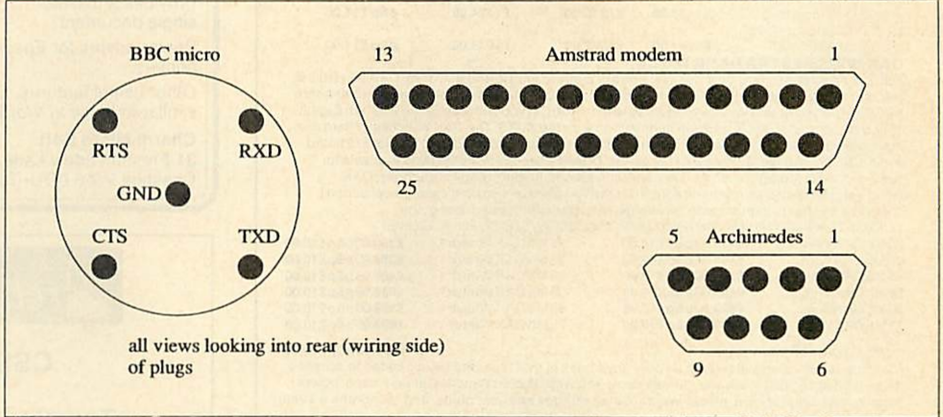


Figure 1: Numbering the connections on the BBC micro, Arc and Amstrad modem

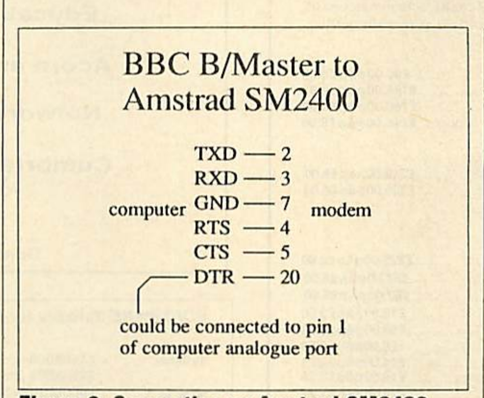


Figure 2: Connecting an Amstrad SM2400 to a BBC model B or Master

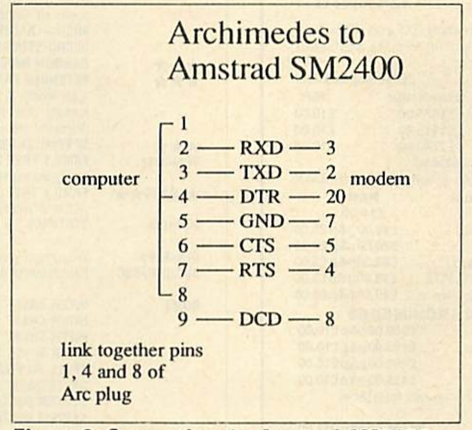


Figure 3: Connecting the Amstrad SM2400 to an Archimedes

easily with split baud rates and do not require a DTR line fiddle.

Archimedes

In theory, Archimedes users have no problems, since the specification includes a standard IBM-type serial port. In practice, however, there are difficulties. Firstly the port is a nine-pin 'D' connector as found in the IBM PC-AT, not a 25-pin connector as on the PC, so the RS232 cable supplied with the modem is no use. Secondly, in early versions of the Arthur operating system the serial port was not adequately supported and a patch which can be obtained from Acorn Customer Services – (the address is in the Customer Hotline column on page 10) is necessary. This has been corrected in Risc OS. Thirdly the pins are not wired as they are on the PC-AT. This appears to be because the Archimedes serial chip handles the CTS and DCD lines in different ways. A bug in the chip itself means that it cannot be made to work correctly.

Figure 3 shows details of how several authors of Archimedes terminal software have agreed to standardise on the wiring of the serial port. This includes Beebug, author of *Hearsay*, and BBC Soft, which is writing *ArcComm*. Note the extra link between pins 1, 4 and 8.

Using this arrangement and an advance copy of BBC Soft's *ArcComm*, I experienced no difficulties with the modem except for the split baud rate problems in V23 mode.

Value for money

It must be said that the Amstrad SM2400 modem represents remarkable value for money when compared with other modems of a similar specification, and must be the best buy for most computer users. BBC B, Master and Archimedes owners will not be able to just plug in and get on-line, although with a little care and patience I found the modem could be made to operate perfectly well.

Amstrad SM2400 modem; £286; Amstrad Brentwood House, 169 Kings Road, Brentwood, Essex CM14 4EF.

SOFTWARE

RECORD KEEPER

Dave Lawrence examines the latest in file managing systems – and finds that it could be better and cheaper

Pres's *Advanced File Manager (AFM)* is another in the ever-widening range of disc utility ROMs. It does, however, have a few very nice features for the £29 it costs. At its simplest level, *AFM* is simply a front-end to the standard filing system. It works equally well with DFS and ADFS, although it is really more suited to the hierarchical nature of the latter. *AFM* will work in any machine from Electron to Compact. Unfortunately it does not work with a network: this would have been a boon, especially when using the 'Copy' function.

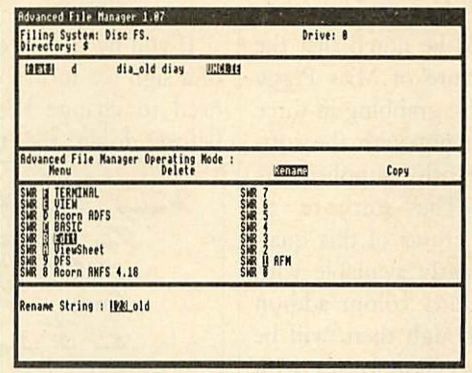
The manual contains instructions for each machine on where best to plug the ROM in. Once safely installed, the *Afm command will start the system. If you really want you can even configure your Master to automatically enter *AFM* when you press Break.

Once started, the screen changes to mode 0 and five boxes are drawn down the screen. On a Master, the outside of these boxes is then flood-filled. This takes an age, and really gets annoying. You can press Escape to stop it. But why not just draw the boxes and background a quicker way?

These boxes contain (from top to bottom) the current filing system, drive number and full directory, a list of the files in the current directory, the four available *AFM* modes, a list of the sideways ROM and RAM images in your machine and last but not least, the current 'rename string'.

The cursor can be moved within these windows with either the cursor or 'Snapper' keys (ZX:/). In general, Return is used to select items. You move between the windows by pressing Space. I found this horribly fiddly: if you 'overshoot' the window you are trying to get to, you need to go through them all again. This system is at its worst when trying to change mode, as it can take at least four keystrokes to enter a new mode – a short cut system, maybe using the function keys, would help.

Escape is used to return from accidentally selected commands, but it is also used to exit the system – so don't hold down Escape for too long, especially when aborting the flood-fill!



AFM: easy to learn but low on 'extras'

AFM has four modes of operation. Menu allows you to wander about a disc, entering directories and loading files. The current file is highlighted with a '>' for an ordinary file and a '*' for a directory. But unless a file is the current, highlighted one, you can't tell files and directories apart. The outcome of selecting a file depends on which sideways ROM or RAM is currently selected. With Basic you are presented with CHAIN, LOAD and a smattering of * commands. If you have *View*, then you can LOAD, READ, PRINT and so on. This is perhaps one of the nicer features of the ROM – you can even extend the system, with an Osword call, so *AFM* 'knows' about other loading procedures. It already has information about *ViewSheet*, *ViewSpell*, *ViewStore*, *Wordwise*, *Wordwise Plus*, *InterWord*, the Basic Editor and *Edit*.

One 'quirk' is that once a command is executed in this way, you are returned to Basic or the selected language, so commands like *Type and *Dump are not particularly useful – you must re-enter the system with *Afm again. At least you are left in the same directory. There is also no *Info command.

Delete mode is used to delete files. The files must first be 'marked' in the file window with Return. Delete marks whole directories. Copy will then delete the marked files. Dangerous, because all the 'active' keys are a trifle close together. Deleting isn't recursive, so you must clear out directories before deleting.

The Rename option is used to rename files. It has a, perhaps, unique feature which is a wildcarded rename. You first select the file in the file window, you then enter a 'rename string' in the bottom window. This can contain ordinary Ascii characters, the '*' meaning the file's old name, and CTRL 1 to CTRL 9 which mean the first, second...etc. letters of the old name. So CTRL 1, CTRL 2, CTRL 3, 'Old' would rename the file with the first three characters of the old name plus 'old' tacked on the end, and the same for other selected files.

Finally, the Copy option is a comprehensive file copying system that will deal with different directories, drives and even filing systems. As usual you select the files and directories to copy from the file window, and then press Copy. It prompts for disc changes as and when necessary. It uses as much memory as it can find, including any Sideways RAM, Shadow RAM and the Tube if present plus Pres's own add-ons.

One added feature is that it will split large files across more than one disc if they won't fit. This enables large files on Winchesters to be backed up onto floppies. Unfortunately, you have to remember which files are split in this way so they can be reconstructed. This feature does reveal one rather nasty omission – there is no formatter and more importantly no method of entering ordinary * commands. *AFM* does have a built in link to Pres's Control Panel drip to alleviate this – but £60 for the combination of ROMs is too steep.

I found *AFM* easy to learn but there aren't enough 'extras'. The load mechanism and the rename and copy option are good – perhaps with more time taken over the user interface, a formatter built in, compatibility with network and a lower price, *AFM* would be worth it. It's good, but not that good.

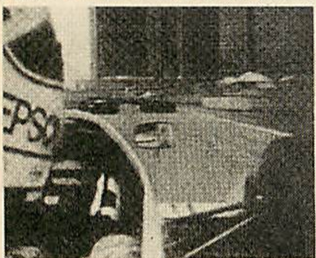
LETTERS

BBC Acorn User, 20-26 Brunswick Place, London N1 6DJ. BTG/TTNS 81:RED001

DIGITAL DESIGN

Sir, As designer of the Watford Arc Digitiser, I feel I must correct some inaccuracies and answer some of the criticisms made in the review in the January issue of *BBC Acorn User*.

The reason that a board-mounted BNC connector was not used is that BNC plugs can be rather tight, and so repeated connection and disconnection would put a lot of stress on the board. Although you can get connectors which PCB mount and fix to a panel this would not allow the rear panel position to be adjusted, as is necessary on some Archimedes machines. So the panel-mounted connector used is the best bet. I agree the rear panel metalwork is not wholly satisfactory, and this is being changed to the more traditional design.



The digitiser in action

Sprites may be generated for 2, 16 and 256 colour modes, not just mode 12 as stated in the review.

I'm currently updating the digitiser software to cope with the new screen modes in Risc OS, and I hope to have this update included on the support disc which will be supplied with the Risc OS upgrade.

It should be noted that the colour picture of Miss Piggy was done by grabbing in three passes, but not with the software currently supplied by Watford. The software to produce pictures of this quality is currently available with the Lingenuity colour add-on board, although there will be a separate version for use with mono cameras and filters.

Mike Harrison
London

The source of the Miss Piggy picture was omitted from the caption in error.

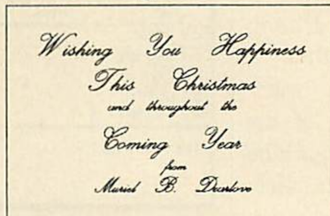
FANCY FONTS

Sir, I read with interest Kevin Kealy's comments on Wight Scientific's *Signwriter* program in the December issue of *Acorn User*, and feel like adding some of my own. I have been using this package for about a year. There were a few problems originally, but Wight Scientific was quick to sort them out.

I enclose a notice that I prepared for the handicrafts class of which I am a member. It had to be done in three separate goes, as you can't change fonts during printing.

One thing which was not mentioned in the review was that you can load a sign into a wordprocessor and do a little editing there. It is then quite easy to adjust the line spacing and so on. But if you want to replace one letter with another take care, as the letter spacing is always proportional.

If you need to keep the text of a sign for future use, you'll need to change the filename before doing the next sign.



Miss Dearlove's card

Each one is saved as 'Sign', so that any further sign saved on disc overwrites its predecessor.

In spite of its slowness, I think this program is quite excellent; I have not seen another as good.

And it comes up black, too, even when using a well worn printer ribbon.

MB Dearlove
Chessington

Muriel Dearlove's pretty Christmas card to *BBC Acorn User* was printed using *Signwriter* and the colour printing techniques she described in August 1988's *Acorn User*.

SON OF PRTSC

Sir, Like many of your correspondents, I found the PrtSc utility very useful when using *ViewStore*. The modification in response to Mr Duncan's letter resolved one problem and I especially welcomed the further modifications in the December issue.

But when I use the utility with the December additions on my Master, there seems to be the original problem of an omitted space after a string printed in inverse video.

Is there a further bug or have I got something wrong?

Dr RSF Harding
West Yorkshire

```
  390 LDX #2

delete lines 500-640

  500 CPY #&AB
  510 BNE exit

  670 PLA
  680 LDY #0
  690 PHA

 1080 BMI loop0
 1081 BNE loop2
 1082 .loop0
 1083 LDY #3
 1084 JSR rvstext
 1085 LDA #135
 1086 JSR osbyte
 1087 TXA
 1088 PHA
 1089 LDY #7
 1090 JSR rvstest
 1091 PLA
 1092 BMI loop1
 1093 BNE loop2
 1094 .loop1
 1095 LDA #32
 1100 .loop2

 1601 :
 1602 .rvstest
 1603 LDX #4
 1604 .rvsloop
 1605 LDA rvsdata,Y
 1606 JSR oswrch
```

The amendments in the box above are the definitive changes for PrtSc. Add these lines to the version of the program printed in August 1988's *Acorn User*.

It combines the ability to print inverse video and deal properly with spaces. Plus it now works on the Compact with *ViewStore* too. For the technical reader, it uses a different event from the original – number 2, character entering input buffer – to check when your press CTRL-Copy.

FASTER MASTER

Sir, I read with interest your article published in the December 1988 issue of *Acorn User* on printing high resolution mode 0 screen dumps. This program was excellent, but was quite slow when printing out because of the need to load and reload each of the two screens. Indeed, if anybody did, as you suggested, write a program using more than two screens, it would take a very long time.

I have a BBC Master and as this program used only two screens, I decided to use Shadow RAM to store each one. There are only a few alterations to the program:

```
370 IF GrOff% <>0 THEN
MODE 128:HIMEM=
&3000

DELETE lines 380,390

1440 *FX 108,1
1445 *FX 113,2
1510 *FX 108,0
1515 *FX 113,1
```

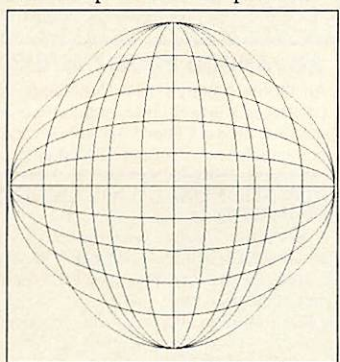
This improves the program greatly. The FX 108 and 113 commands, along with the FX 112, control the use of Shadow RAM and are very useful if you are using two screens for animation. FX 108 switches either the shadow or main memory into the memory map immediately. FX 113 affects whether shadow or main memory is displayed on screen and FX 112 decides which memory is written to. You could use FX 112 to write to shadow memory, but have main memory displayed, so nothing you type would appear on screen!

While on the subject of spooled files, if you are printing several copies of the same screen, an easy way to speed this up is to do something like this:

```
*SPOOL xxx
*SDUMP
      (screen dump command)
*SPOOL
*PRINT xxx
*PRINT xxx
```

and so on.

During the first dump, all the output to the printer is also sent to the file 'xxx'. On subsequent dumps, this data is loaded in from disc, therefore avoiding repeatedly calculating the data needed to send to the printer. But it does create a gigantic file though.



640 x 512 screen dump

I have also read your January 1989 issue, and welcome your commitment to the humble Electron, BBC B/B+ and Master!

AW Cumming
Co Durham

The amendment certainly speeds up Michael Geller's high-resolution screen dump if you have a Master.

HOT STUFF

Sir, I would be very grateful for the answers to a number of questions.

I own a Master with co-pro adaptor and a 512 unit. I originally had the second processor inside the Master, but overheating problems forced me to add the adaptor. Unfortunately, the adaptor has a very short lead. Can I extend it somehow?

In general I have been very pleased with the 512 unit. Despite popular belief it seems to run most programs, but it does have one serious drawback. Discs formatted using the 'DISK' utility cannot be read by other MS-DOS machines. I do not particularly care why this should be so, but since this is the facility that makes MS-DOS worth bothering with at all, I would indeed be grateful for a solution to the problem.

I notice an advertisement in your magazine for a DOS+ problem solver. Do you intend to review this product?

K V Kirk
Reading



PC clones prefer 360k format

All second processors must have a relatively short lead – because of interference and capacitance problems that get worse as the lead is extended. The lead should only be long enough for the co-pro adaptor to sit neatly to the right of the keyboard.

The commonest disc format for PC systems is the 360k format, for which the DISK utility offers an option. Most PCs cannot read the DOS-Plus 800k format. We are looking at Shibumi Software's problem solver.

TELETEXT TROUBLES

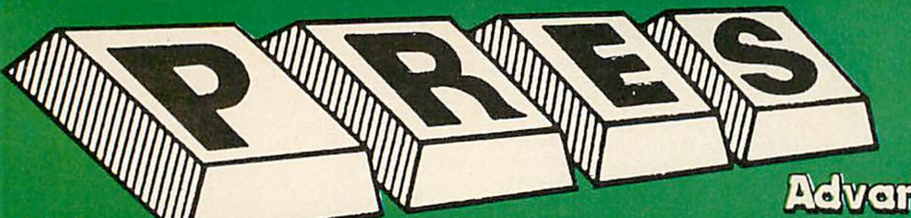
Sir, I have been using a BBC B for about three years at home as well as at my office. I like the system; in fact, *View* and *ViewSheet* have become the basis of my administration. The BBC is still comparatively rare in Belgium, which makes communication with other users difficult. Still, *BBC Acorn User* seems to solve this by bringing together ideas of people with similar interests.

I bought a GIS teletext adapter, but have never been able to get it working in Ghent. To my surprise, I cannot scan BBC 1 or 2 and not even any Belgian programs, even though reception of television programs is good.

The ability to download telesoftware was the sole purpose of purchasing the adapter. Please could you offer some advice?

Prof Dr DL Clement
Ghent
Belgium

In Belgium and Holland, BBC 1 and 2 are sometimes available on cable TV systems. But there are two problems. First, the cable operators may strip off the teletext signals, leaving just the TV program signals to go to your house. So there may be no CEEFAX there to pick up. And some cable systems work on VHF rather than UHF: the adapter can't be tuned to VHF stations so it can't pick up the signals. The only way it will work is with an external UHF aerial picking up signals from Britain, and then the signal may be too weak for good CEEFAX reception.



TEL: 0276 72046
FAX: 0276 51427

Now available through PRES

Advanced Computer Products

range of software products

ADVANCED DISC TOOLKIT (01)/M/B/E/C — **£34.50**

Any Acorn user including Master, BBC B+, Electron, DFS, 1770 DFS, ADFS, 2nd & co-processors A.C.P.'s BEST SELLING product containing over 30 commands inc: powerful memory & disc editor, search memory/disc/basic, catalogue/unplug ROMS, load/run programs below page, automatic menu, file transfer (inc locked cassette files), ADFS utils etc etc ("It's superb" . . . Database Pubs. - "A top class toolkit - I have no hesitation in recommending it". . . Acorn User Nov '86 (16K EPROM & FULL MANUAL)

ADVANCED CONTROL PANEL (20)/M/B/E/C — **£34.50**

ACP is a front end control panel language providing a sophisticated yet friendly interface between user and computer for access to Languages. MOS functions and the users own file utility etc. Main features include pull down windows, simple to change MOS configure, floating point calculator, file manager, SW ROM's facilities. (16K EPROM & FULL MANUAL)

"It's very easy to create an entire customised front end for your own use." – *Acorn User, August 1987.*

"ACP is much better than any of the other front end systems I've seen." – *Acorn User, August 1987.*

"I can recommend it to anyone who wants easy access to the Electron's functions." – *Electron User, August 1987.*

ACPs main features are:-
★ Pull down windows operate throughout
★ Users can create their own windows

PRES Archimedes Utilities — New Product . . . A low cost utility for Arc users containing . . . memory allocation map, screen mode table, file type listing, module interogator, continuous compaction and hard disc back-up.
Only £11 ex VAT, £12.65 inc.

Colour Monitor Phillips CM8833 14" Medium Res. (600 × 285) RGB, CVBS, SKART, and audio inputs. Complete with BBC/Electron RGB lead. Securicor delivery included.
£213 ex VAT, £244.95 inc.

ADVANCED ELECTRON DFS (05)/E — **£24.15**

Electron & Plus 3 users . . . gain BBC compatibility by adding the Advanced Electron DFS (1770 DFS) this is the same disc filing system supplied with the BBC B+. Now you can produce and access (compatible) BBC disc based software. We can also supply 5.25" disc drives to add to your Plus 3 (inc 2nd drive adapter). "ACP has produced another superb ROM for the Electron". . . Electron User Feb '86 (Supplied on 16K EPROM + DFS MANUAL)

Also DFS E00. An alternative to the DFS, designed for use in Sideways RAM (ABR). **(14)/E + ABR** (3.5" ADFS disc + manual) ***£19.99***

ADVANCED PLUS 7/M/E/B/C £39.50 ex VAT; £45.42 inc VAT

An internal battery-backed RAM upgrade for the Advanced Plus 6. TWO 16K pages of Sideways RAM, battery-backed and featuring full write protect facility. Just like ABR but fitted internally & vacating a cartridge slot. This product is compatible with all Acorn BBC/Master & Electron computers.

ADVANCED ROM ADAPTER 2/M/E £13.00 excl VAT: £14.95 inc VAT

An Acorn approved cartridge containing a card with special 'zero' profile sockets that allow you to fit compatible 8k or 16k EPROMS/ROMS. The cartridge is fully enclosed providing complete protection for your ROMS. Simple to use - No switching - complies fully to the Acorn (sideways) ROM filing system. "The best ROM cartridge is by far the ARA 2. . . *A&B Dec 86*

ADVANCED DISC INVESTIGATOR (06)/M/B/E/C — **£28.75**

A very powerful Disc utility for standard & non-standard discs. Backup most protected discs, edit any type of non-standard disc, check & repair faulty tracks, create new disc formats, copy 40 track discs to 80 track discs, verify two non-standard discs.
("ADI features an extremely comprehensive sector editor, and one of the finest I've seen". . .Tubelink on Prestel) (supplied on 16K EPROM + manual)

ADVANCED BATTERY-BACKED RAM M/E

A standard Acorn approved cartridge but containing 32k (2 x 16k) of sideways RAM. The added bonus is the battery-backed feature that holds the RAM contents when the power is switched off! Different ROM images can be loaded into either bank from ROM images previously saved. The banks can also be locked to imitate ROM use. Now it is possible to have View & ViewSheet in one cartridge every time you switch on. Other uses include &EOO ADFS, printer buffer, ROM software development. The use of ABR is simplified by the newly written PRES software utlities which include:- SaveROM, LoadROM, Lock, Unlock, Printer Buffer, Zero and MakeROM a new utility to put your own software from disc or tape into ABR and use the ROM filing system. All software is supplied in ABR with a simple menu to transfer the utilities to your own media. No hardware switching - totally software controlled. Instructions for using supplied software and necessary information for users developing their own applications.
"It's a superb add-on and a must for all serious Electron Users". . .
Electron User **£39.00 excl VAT; £44.85 incl VAT**

ADVANCED 1770 DFS
3 versions ADM/C(11) - ADB(12) ADE (13) — **£34.50**

ACP have totally re-written the Acorn 1770 DFS, enhancing existing features & adding new ones. The result is a very fast and powerful disc filing system with the ability to operate in double density occupying both sides of a disc (640K). Automatic file relocation, improved file handling, 62 file catalogue and Sways RAM can be used as a fast RAM DISC. (16K EPROM + comprehensive manual)

PRINTER . . . Panasonic KX-P 1081 Graphic Epson Compatible NLQ ready to connect including capable, delivery and VAT £155.65 ex VAT £179.00 inc VAT (Spare Ribbon £5.50 ex VAT; £6.32 inc VAT)

DISC DRIVES	Ex VAT	+ VAT
Cumana 5.25 dbl/sided 40/80 track, switchable, inc psu	£113.00	£129.95
Cumana 5.25 single/sided 40 track, inc psu	£112.17	£129.00
Cumana 3.5 dbl/sided 80 track, inc psu	£112.17	£129.00
PRES special 3.5 single/sided 80 track, inc psu	only £59.00	£67.85

PRES – ADVANCED FILE MANAGER M/B/E/C

The ultimate 'front-end' for ADFS and DFS £25.00 ex VAT; £28.75 inc VAT

```
Advanced File Manager 1.04 (C) PRES 1988.
Source: Advanced Disc FS.:0.$.Software.AFM.afm104
LETTER102  Letter103  letter104  manualla   manuallb   manual2    manualch
PAL        PALB       PALM       PRSRAM     q
s3         s4         s5         s6         s7         s8         s9
sd         SDC        SDINFO     SPEEDY     ZF         ZG         ZH
ZPprint    ZPZG       ZPZH
Target: Advanced Disc FS.:1.$.AFMarchive
AFM        ASM        s1         s2         s3         s4         s5
s6         s7         s8         s9
(C)hange : Off  (F)ollow : Off  (O)ver : On   658951 bytes free  10 marked
s6 noted for copying to Advanced Disc FS.:1.$.AFMarchive
s7 noted for copying to Advanced Disc FS.:1.$.AFMarchive
s8 noted for copying to Advanced Disc FS.:1.$.AFMarchive
s9 noted for copying to Advanced Disc FS.:1.$.AFMarchive
```

Screen picture shows AFM in Copy mode on Master Turbo

AFM follows the PRES 'Master Plan' of upwards compatibility – it runs on Electron, BBC B, B+, B+128, Master 128 and Compact, with Second/Co-processors and Acorn-compatibile versions of DFS & ADFS.

AFM has four distinct modes:

MENU – allows browsing through the files and directories on a disc. Files are started from a menu of up to 7 options chosen for a selected ROM. Loaders are provided for Basic, The Basic Editor, View, ViewSheet, ViewStore, ViewSpell, Edit, Wordwise (+) and InterWord. This list can be expanded infinitely using an Acorn-approved OSWORD call. . . full details and example in the manual..

DELETE – allows files to be marked and then deleted with one keystroke.

RENAME – allows one or more files to be marked and then renamed using a wildcarded name, ie one which varies with each file renamed. Thus you could rename s1, s2 and s3 to be s1_old, s2_old, and s3_old in one operation. . . and that's only the beginning! As well as using the whole of the original name you can also pick out individual characters to form part of the new name.

COPY – the strongest feature of AFM. It is a two stage copy routine. With both source and target directories shown on screen the files to be copied are marked. Once all the files have been marked copying is started and the computer can be left to get on with it!

Large files can be split across several disks, and recombined.

As much as possible of the computer's memory is used for copying files, including unused parts of shadow screen memory, sideways ram banks (inc. AP7), ram cartridges (inc. ABR (32K) and AQR (256K)), tube memory (up to 61K), B+ paged ram (12K) and unused parts of the Slogger Master Ramboard (Electron).

Comprehensive error trapping and recovery is provided, so a copying run will rarely have to be aborted unfinished! And there's much, much more.

THE ADVANCED PLUS 3

Now you can turn your Electron & +1 into a full disc system - no more waiting for tape loading or 'bad block'/'data?' messages. A.P. 3. gives you. . .



1. A fully Acorn compatible 1770 interface
2. 80 track 3.5 disc drive, as used by Acorn (320K capacity)
3. Separate PSU
4. Acorn ADFS
5. Welcome disc
6. Utilities
7. Full documentation
8. All the advantages of the original Plus 3 PLUS extra ROM socket.

OUR TOP SELLING PRODUCT

All this without dramatically increasing the required desk space!
Now well into the SECOND THOUSAND production.
Remember - 2nd drives (3.5 or 5.25) can be added and the AP3 drive can be used on a BBC or Master computer! Also most Electron disc-based software is supplied on 3.5 ADFS discs.
The only fully compatible disc upgrade running Acorn's own preferred filing system (supplied on: Plus 3, Master 128, Master Compact and now the Archimedes)

EXTRA BONUS
3 games on disc - SNAPPER - DRAUGHTS - REVERS!

COMPLETE PACKAGE ONLY
£109.50 excl VAT; £125.93 inc VAT

ADVANCED PLUS 1. . .The plus 1 is the main expansion for the Electron. It provides the Centronics parallel printer, printer port, joystick interface and 2 cartridge slots into which go ROM cartridges including View, Viewsheet, Pascal, Logo and our own popular AP4 disc upgrade.
£50.00 excl VAT; £57.50 inc VAT

ADVANCED PLUS 6. . .a fully buffered 6 ROM expansion module for the Electron user. AP6 is fitted inside the advanced Plus 1 or modified Acorn Plus 1 (when used with the Acorn Plus 3, 5 ROM sockets are available). All sockets are designed to accept either ROM/EPROMS or RAM chips. A further feature is the optional AP7 upgrade.
"A marvellous piece of design. . .don't hesitate buy it!" - *EU, May '88*
£33.00 excl VAT; £37.95 inc VAT
Upgrade service available for original Acorn Plus 1 please call for details

MUSIC 5000
The popular BBC music synthesizer available for Electron users. Required 1MHz buff (see AP5). Supplied as M5000 Synthesizer hardware, 16k ROM, disc utils, and full documentation.
£99 excl VAT; £113.85 inc VAT
Please state 3.5" ADFS/5.25" DFS

ADVANCED PLUS 5

A unique interface for those wanting the maximum expansion from just one slot in the PLUS 1 AP5 contains:- A User port for connecting peripherals such as a mouse. 1 MHz bus allowing Music 5000(e), prommers and various control devices to be added. Tube interface for connecting and Acorn 2nd processor or even a Master Turbo board (through a 'Co-Pto Adaptor') - & TWO spare ROM sockets (1 high priority). All hardware connections are Acorn compatible thereby allowing many BBC products to be added (remember that some software modification may be necessary for the Electron). So although some expansion options may appear expensive on an Electron you do have upward compatibility.
£55.00 Ex VAT; £66.70 inc VAT

Advanced Plus 2 ROM
We feel this is one of the best, low cost, additions we have produced for the Electron & +1 user, especially for Plus 3, AP3, ABR & AP7 users now with this easy to fit upgrade you can add:
1) Fix for Tape filling system in Hi-res screen modes. 2) * ROMS- displays ROM/ROM images present. 3) * UNPLUG disable ROM/RAM image. 4) * INSERT - enables or inserts a previously unplugged ROM. 5) * KILL - totally disables the Plus 1. 6) * LOCK - locks a sideways RAM bank in ABR, AQR, AP7 7) * LROMS - locks all sideways RAM banks found. 8) * UNLOCK - to unlock a sideways RAM bank in ABR, AQR, AP7 9) * UROMS - to unlock all sideways RAM banks found. 10) * SAVEROM - saves a ROM image to current filing system. 11) * LOADROM - loads a ROM image from current FS into a RAM bank. 12) * FORMAT - will format an ADFS disc for Plus 3 or AP3. 13) * VERIFY - tests every sector on an ADFS disc. 14) * VFORM - formats and verifies an ADFS disc in one command. 15) * BUILD - creates a text file that can be used by *EXEC (ie !BOOT). 16) * LIST - displays a numbered listing of a text file 17) * TYPE - displays a file on screen with no line numbers. 18) * DUMP - to view a file's contents on screen. 19) * LANG - selects a default language to be booted on {CTRL-BREAK} 20) * HELP - provides a full 'help' list on all the ROM's commands. 21) * AQRPAGE - selects specified page in AQR.
Now there is no need to search for your utilities disc every time you want to Format/Verify a disc, Build a !BOOT file or lock/unlock/Load a ROM image into ABR PLUS much more . . . . . the ideal companion from the company that produces the Acorn Plus 1.
£11.00 ex VAT; £12.65 inc VAT
The AP2 is the definitive Plus1 ROM. . . . I'm not sure what i'd do without it. . . . like all of PRES's other products, it's been well worth waiting for"
July '88

FILING SYSTEMS

ADFS VERSION 1.1
Suitable for existing Plus 3 or A.P.4 users. This new version has the software fixes for Zysyshelp, write protect disable & compaction. Also Winchester code has been replaced with the necessary driving software to handle AQR as a 256k RAM DISC. Please note - ADFS is Acorns adopted standard filing system supplied on the Plus 3, Master 128, Master Compact & now the Archimedes. Supplied on 16k ROM with Welcome disc & utilities. Please state 3.5/5.25 welcome disk.
£14.95 ex VAT; £17.19 inc VAT
(ADFS manual supplied separately)

ADFS EOO
For Electron users with either Plus 3 or A.P.4 and 32k of S/W RAM i.e. ABR. All the benefits of ADFS but without all the loss of RAM! Includes all the software 'fixes' call for managing the new & original ADFS. One of the most frequent question we are asked: "How do I get back the memory lost on my Plus 3 system?" Answer: PRES ADFS & EOO regains 3.75k leaving page at &EOO the same as Tape!
ADFS EOO supplied; 3.5 ADFS (manual available separately)
£14.95 ex VAT; £17.95 inc VAT
5.25 ADFS (manual avail. sep.) **£14.00 ex VAT; £16.10 inc VAT**
5.25 DFS(2 discs+ADFS manual) **£19.00 ex VAT; £21.85 inc VAT**
(See Special Package Prices)

DISC INTERFACES (Plus One required)

AP3 INTERFACE: As supplied with AP3 package. A fully Acorn compatible disc interface that will accept any standard 5.25 or 3.5 80T drive with PSU. It runs Acorn's ADFS (as supplied on Acorn Plus Three, Master 128, Master Compact and now the Archimedes) supplied with A.D.F.S. manual and welcome disc + Utilities and 3 bonus games (please specify 3.5 or 5.25 80T format). Also provides a spare 16K rom socket. **Price £52.00 ex VAT £59.80 inc VAT**

AP4 INTERFACE: A fully Acorn compatible disc interface that will accept any standard 5.25 or 3.5 drive with PSU. It runs the 1770 DFS (as fitted in the BBC 'B' and Master) keeps pace at &EOO - has utilities in rom and provides a spare 16K rom socket (DFS manual included. **Price £60.83 ex VAT £69.95 inc VAT**

AP34 INTERFACE: Get the best of both filing systems. Now available from PRES the ultimate interface. Fitted with both Acorn approved filing systems. . .Acorn's current standard ADFS and Acorn 1770 DFS (which can be run at &EOO) ADFS and DFS manuals supplied + ADGFS welcome disc with utilities.
Price £69.55 ex VAT £79.98 inc VAT

SOFTWARE PRODUCTS

ADVENTURE GAMES 5 different adventure discs:- Ultimate Prize, Dreamtime, Priate's Peril, Taroda Scheme & Stranded.
All 3.25 ADFS £6.95 ex VAT £7.99 inc VAT each disc

Advanced Games Compendiums - on disc with so many of our products providing more 'serious' add-ons for the Elk; we thought it was time to allow easy Access to some of the favourite games ON DISC! . . . Three volumes of popular games, previously only available on tape, now 'instantly' loadable from menu on disc. Titles such as Croaker, Felix & Fruit Monsters, Killer Gorilla, Danger UXB, Swoop, Ghouls, Invaders, Swag, Galactic Commander, Felix in the Factory, Bumble Bee, Gauntlet, Frenzy, Moonraider, Positron etc. etc.. Each volume contains EIGHT menu selectable games.
3 ½ ADFS £9.99 ex VAT £11.49 inc VAT
5 ¼ DFS. £8.99 ex VAT £10.34 inc VAT

View the Acornsoft word process for the Electron & +1 inc. full documentation £14.94 inc VAT
ViewSheet The Acornsoft. . . . . spreadsheet for the Electron & +1 inc. full documentation £14.95 inc VAT
View & ViewSheet special price . . . . £22.00 inc VAT

SPECIAL PACKAGE PRICES

Package	ex VAT	inc VAT
AP1 + AP3	£139.00 ex VAT	£159.85 inc VAT
AP1 + AP6	£77.00 ex VAT	£88.55 inc VAT
ABR + 3.5" ADFS E00	£48.65 ex VAT	£55.95 inc VAT
ABR + 5.25" ADFS E00	£46.95 ex VAT	£53.99 inc VAT
ABR + 5.25" DFS (ADFS E00)	£51.00 ex VAT	£58.65 inc VAT
AP5 + Music 5000	£152.17 ex VAT	£175.00 inc VAT
AP7 + 3.5" ADFS E00	£49.52 ex VAT	£56.95 inc VAT
AP7 + 5.25" ADFS E00	£48.65 ex VAT	£55.95 inc VAT
AP7 + 5.25" DFS (ADFS E00)	£52.13 ex VAT	£59.95 inc VAT
AP4 + CS400	£147.78 ex VAT	£169.95 inc VAT
AP1 + AP4 + CS400	£189.00 ex VAT	£217.35 inc VAT

********** ACCESSORIES **********

	ex VAT	inc VAT
Electron power switch This useful accessory provides a double-pole in-line switch with a new power jack-plug already attached; just connect to the existing lead, having removed the old jack-plug.	£3.96	£4.55
Plus 3 2nd drive adaptor converts the fitting at the back of the original drive which has been configured to Drive 1.	£6.91	£7.95
AP3 2nd drive lead replaces existing drive cable with one containing an extra connector for adding a second drive configured as Drive 1.	£5.96	£6.85
Electron Advanced Users Guide		£3.95
ADFS Guide Manual		£5.00
DISCS 3.5 10 in plastic library box		£19.95
5.25 twin gift pack		£1.49

M = Master B = BBC C = Compact E = Electron

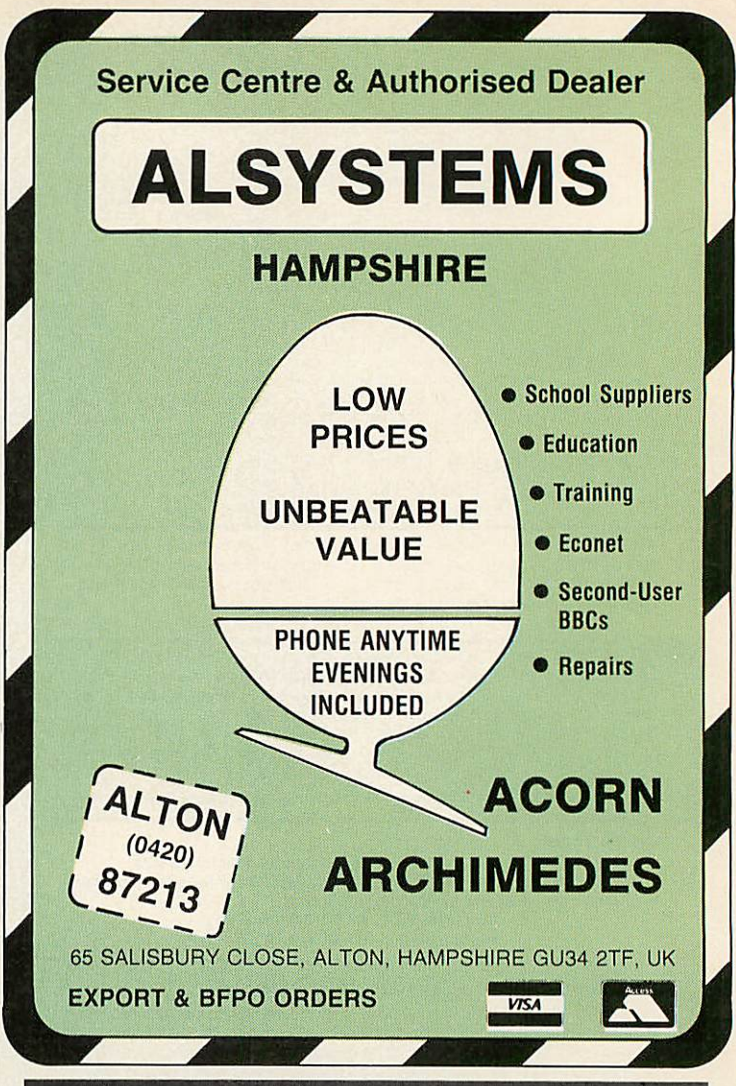
Please send order to:-
P.R.E.S. LTD.,
6 Ava House, High Street,
CHOBHAM, Surrey, England,
GU24 8LZ. Tel: 0276 72046 (24 hr).
Fax: 0276 51427
(Mail order only)
All our prices include UK delivery & VAT.




(in event of any query— please include your tel. no.)

Product Qty @ Total

Name ....
Address ....
....
....
Postcode ....
Tel: .... I enclose payment for £ ....
Credit Card No.: .... Exp date .... (Ref A116)



Service Centre & Authorised Dealer
ALSYSTEMS
HAMPSHIRE
LOW PRICES
UNBEATABLE VALUE
PHONE ANYTIME EVENINGS INCLUDED
● School Suppliers
● Education
● Training
● Econet
● Second-User BBCs
● Repairs
ALTON (0420) 87213
ACORN
ARCHIMEDES
65 SALISBURY CLOSE, ALTON, HAMPSHIRE GU34 2TF, UK
EXPORT & BFPO ORDERS
VISA

FREE ADS

Wanted Penfriend aged 13-16 with BBC Master and 3.5-inch disc drive. Contact: Graham Wharton, 1 Highfield Close, Eaglescliffe, Cleveland.
Penfriend wanted with BBC Compact, disc drive. Contact Mohon Ali, 276 Staniforth Road, Sheffield, S9 3FT.
Penpals Archimedes user in Greece. Hints, tips, etc. Stelios Kontozoglou, 31 AG. Paraskevis, Str 145 61, Vifisia, Athens, Greece.
Watford 3.5-inch new disc drive for BBC O/S 80T. Unwanted part of package deal, £50. Tel: Derby (0332) 812138.
Bitstik for model B, 6502 second processor. Hi-Basic, DNFS, ROMs, Bitstik multi-plotter driver, £200. Tel: (0705) 599158 (South Hants).
BBC B issue 7 Acorn DFS Z80 Torch pack. *Perfect* & *Wordstar*, twin drives, high resolution monitor. Offers? Tel: 01-940 3985.
BBC B DFS APTL sideways ROM board. Single DS/DD, lotsa software, Digimouse, £375. Tel: Luton (0582) 580680. Consider exchange Atari 1040ST.
BBC B (8271) DFS for sale, as new. Manuals, boxed, plus cassette and TV monitor, £220. Tel: (0255) 429883.
Archimedes A310 IMB RAM 20Mb hard disc. Lots of software, games, PC emulator, printer, manuals. As new. £1,500 ono. Tel: Leon 01-466 5447 (eves).
BBC B, Opus DDOS, leads, software and manuals. Excellent condition, £220 ono. Tel: 01-441 1019.
Master Compact, TV modulator. Dump ROM, great condition, £225 ono. Tel: David 01-428 3581 (eves).
32k shadow board from Watford Electronics, £35. RAMamp 32k sideways RAM board. Six ROMs, lots of software, £20. Tel: (0767) 315443.
Archimedes 305 entry, hardly used. Plus £40 of books, £580 ono. Write to: D Lau, 35 Paddockhall Road, Haywards Heath, Sussex.
Master 128 PC case. Two drives, monitor, teletext (ATS), *InterWord*, *Spellmaster*, two cartridges. ROMs, software, books, leads, etc. £550. Tel: (04575) 67321 (Manchester).
Microvitec standard resolution monitor, £140 ono. ROMboard for Master, £20 ono. Exmon ROM, £10. Z80 books, Zaks & Leventhal. Tel: (0458) 250130.
BBC B issue 7, 40/80T disc drive. Multiprom EPROM programmer for all 28-pin EPROMs. Uvipac EPROM eraser and software. All £320. Tel: 041-641 1200 (Glasgow).
BBC B ROMboard, dual disc drives. Much software, ROMs, £345. Tandy 100 lap-held disc, video unit, modem, software, £245. Tel: (0865) 863333.
Monitor 14-inch colour, RGB comp video sound, medium res, £100. Printer Smith Corona D100, £90. Both excellent condition. Tel: (04243) 4500, E Sussex.
Bargain BBC model B printer & disc drive, £100. Discs, mint condition, £500. Also wanted: Quattro modem. Tel: (0905) 53248.
Electron 64k Plus 1, Plus 3, AP5, AP6 ABR RS232 port. *View*, *ViewSpell*, *Starword*, *Starstore*. All manuals, £230. Tel: (0703) 770464.
Brother HR 25 XL printer. Spare ribbon, superb quality print. Hardly used. Cost £600, accept £300 ono. Tel: 01-789 3004.
Two 6264LP chips, for sideways RAM-boards. 8k each, as new, £12 the pair. Tel: (0799) 40649.
BBC B 1.20 OS cassette recorder. Games, (including *Elite*), manual, book, excellent condition, bargain £220. Tel: 01-881 6912 (eves).
ACP battery backed 32k RAM cartridge, £20. Joystick, £7. *Elbug* magazines, books. Tel: 051-342 6472.
Philips 22 meg amber monitor, as new, £50 ono. Tel: Reading 581549.
Acorn Plus 1 upgraded to AP1 and AP6. Also supplied, AP2. Everything, £80. Tel: Andrew, (0727) 30041 St Albans.
Synthesiser, *Clef-cms*, for BBC + disc. Full size keyboard, 32 oscillators, Polyphonic sequencing, now unobtainable. Cost £400, sell for £200 ono. Tel: (0603) 33508.
BBC B issue 7, Canon drive ROM/RAM-board. Dozens ROMs, mags, discs, tapes, advanced books, print-outs. Hundreds of games, joystick, £350. Tel: (0626) 55262.
BBC B issue 7 + DFS dual DS40/80T drives. Viglen PCU, 65022P. Music 500, modem 2000, loadsa ROMs. Books, discs, £675 ono. Tel: Southend (0702) 330815.
Must sell my Master 512 to buy an Archimedes, £650 (including many extras) + disc drive. Tel: Michael 01-989 0408.
Drive metal cased 3.5-inch + PSU Cumana 5580T. Games, instructions, ROM images, software, discs + userdump ROM, £98. Tel: (0284) 753177 (eves).
BBC B issue 7, DDFS cassette recorder. Extras, £290. Disc, games, *Shark*, *Codename Droid*, *Elixir* (5.25-inch), £5 each. Tel: (0482) 801018.
Acorn Z80 second processor. CPM2.2 bundled software, £125ono. Torch Z80, perfect software, £100ono. Tel: (0203) 225053.
Archimedes A310, colour, plus loads of software. Reference manuals, £950 ono. Tel: Keith (0705) 690416 (eves).
Cannibalise my old model B! Write for a list of parts and prices to: Andrew Moulden, 45D Kelvinhaugh Street, Galsgow, G3 8PE.
Master 128, £250. 40T disc drive, £50. ROMs, mouse, etc, also available. Tel: (0245) 321285.
Wanted BBC B, DFS and *View* or BBC Master 128, preferably with disc drive, monitor and printer. Tel: (0245) 466078.
Wanted: Acorn Cambridge work station. Tel: (0242) 572174 (eves).
Wanted BBC model B micro. Must be in working order. Tel: Hugo (0745) 825036 anytime.
Wanted Marconi Trackerball for BBC B or Master, software, etc. Tel: Sheffield (0742) 368198.
Wanted 8271 chip and ROMs or software, excluding games for BBC B. Tel: 091-528 8802.
Wanted BBC Master 128. 40T 5.25-inch disc drive, medium or high resolution monitor. Tel: R Edwards (0793) 721673.

FREE PERSONAL AD SERVICE

Fill in the form below to a maximum of 20 words (one in each box) and send it to *Acorn User* Free Ads, 20-26 Brunswick Place, London N1 6DJ. Please use capital letters, write clearly, and remember your name, address and telephone number. Without this full information, supplied on a separate sheet of paper, we regret we cannot carry your Free Ad. We cannot accept entries selling or swapping software. This is a service to readers – no companies please. One entry per form only. Free Ads are carried in the magazine as space permits, and any Free Ads not used within a month of receipt will be disposed of.

ACORN USER ADVERTISEMENT PAGES – MARCH 1989

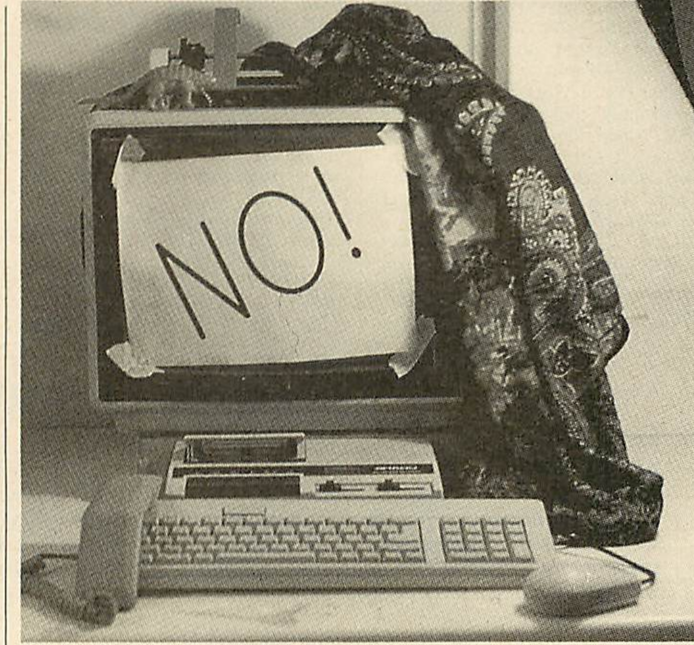
Advertiser	Page
4-Mation	77
A&G Electronics	68
Ace Computers	33
Alsystems	142
Apricote Studios	142
Atari	20-21
B & S Computing	31
Beebug	6, 12
Bright Sparks	142
BV Computer Maintenance	32
Cambridge Micro Systems	124
Care Electronics	93
CCE Catsoft	94
Charm Microsoft	136
CJE Micros	84
Clares	72, 95
Colton Software	2
Compshop	22
Computaccount	48
Computeck	40
Computer Concepts	16, 118-119
Contex Computing	77
CSS	136
Dabs Press	24, 78
Datastore	128
Datathorn Systems	30
ESM	122
HCCS Associates	86
HSV Computer Services	32
Human Computer Interface	44
IFEL	94
Integrex	80
Intelligent Interfaces	68
Karir International	122
Keyzone	94
LCL	77
Leeds City Council	122
Manor Court Supplies	65
Martelec	96
Mayhew Telonics	93
Meadow Computers	120
Mercury Games	28-29
Mewsoft	128
Micro Media	86
Micro Peripherals	74
Microaid	136
Microman Computers	1
Mijas Software	96
Minerva Systems	IBC
Morley Electronics	42
Mydisk Ltd	32
Norwich Computer Services	68
Oak Computers	136
Panasonic	19
Peartree Dram	4-5
Pineapple Software	26
PMS	120
Portobello Trading Company	128
PRES	140-141
Research Machines	IFC
Roland Machines	IFC
Shibumi Software	30
Silicon Croft	8
Silicon Vision	132
Simtron	93
Software Bargains	25
Star Devices	77
Superior Software	OBC,
Technolog	120
Technomatic	27, 34-39
Ted Kirk	122
Telemap Group	23
Terrell Electronics	124
The Computer Depot	122
Towerhill Computer	126
Twillstar Computers	82
University of Reading	122
VMS	30
Watford Electronics	49-64
We-Serve	128
Wight Scientific	124
Wild Vision	26
Wingpass	124

ACORN USER'S

DIARY

Fuss about nothing

Ace reporter Orson Fact has to hand it to the chaps at *C&D Compacting*. They lose the disc drive and processor from their Arc and when Acorn refuses to give them a new one, decide that it must be the shape of things to come. So, unlike Orson and his friends, who have plenty of real news to report to their readers, *C&D* splashes it all over the February cover.



Note the paper-white monitor, cassette port and integral phone

Orson and photographer Holly de Snappe themselves are not averse to hiding in waste bins for stories. It's just what they were told to do in the Ladybird 'How to be a cub reporter' book they read. But Orson suggests that stories found in rubbish bins, as Clive 'Dis' Grace claims his was, are often just that – simply rubbish.

Michael Page, Acorn's publicity supremo, agreed. 'It sounds like a load of rubbish to me, he said, when Orson asked him to comment on *C&D Nimcomputing*.

If you're thinking of buying an Archimedes 205, you'll have a long wait. And if you want to imagine a specification for phantom new Archimedes models, check the DES guidelines on computer hardware for schools – they are much more detailed than anything *C&D* found in its bin. When something really does happen, Orson will tell you first.

Another interesting revelation from the games pages of *C&D Confused* is the rumour of a new Superior game called *Zorbicos*. Dave 'Late' Reader should get the hair out of his ears. In fact, it was going to be a joint venture with Cadbury's, manufacturers of Milk Tray chocolates. And the game would have been called *And all Because*. But it isn't happening now anyway.

And finally, contrary to the *C&D* news, the existing *PipeDream* does work with Risc OS – all they had to do was try it out.

It all goes to show, you can't believe all you read in the Argus Press.

Abuse in brief

■ In the interests of balance, Orson has been racking his brains trying to think of something nasty to say about *The Micro User*. But all he can think of is how late they are reviewing *First Word Plus*.

And it is good to see the staff there do read *BBC Acorn User* – after *BAU* showed the world how to take a good screen shot, they manage to under-expose their only picture of Risc OS.

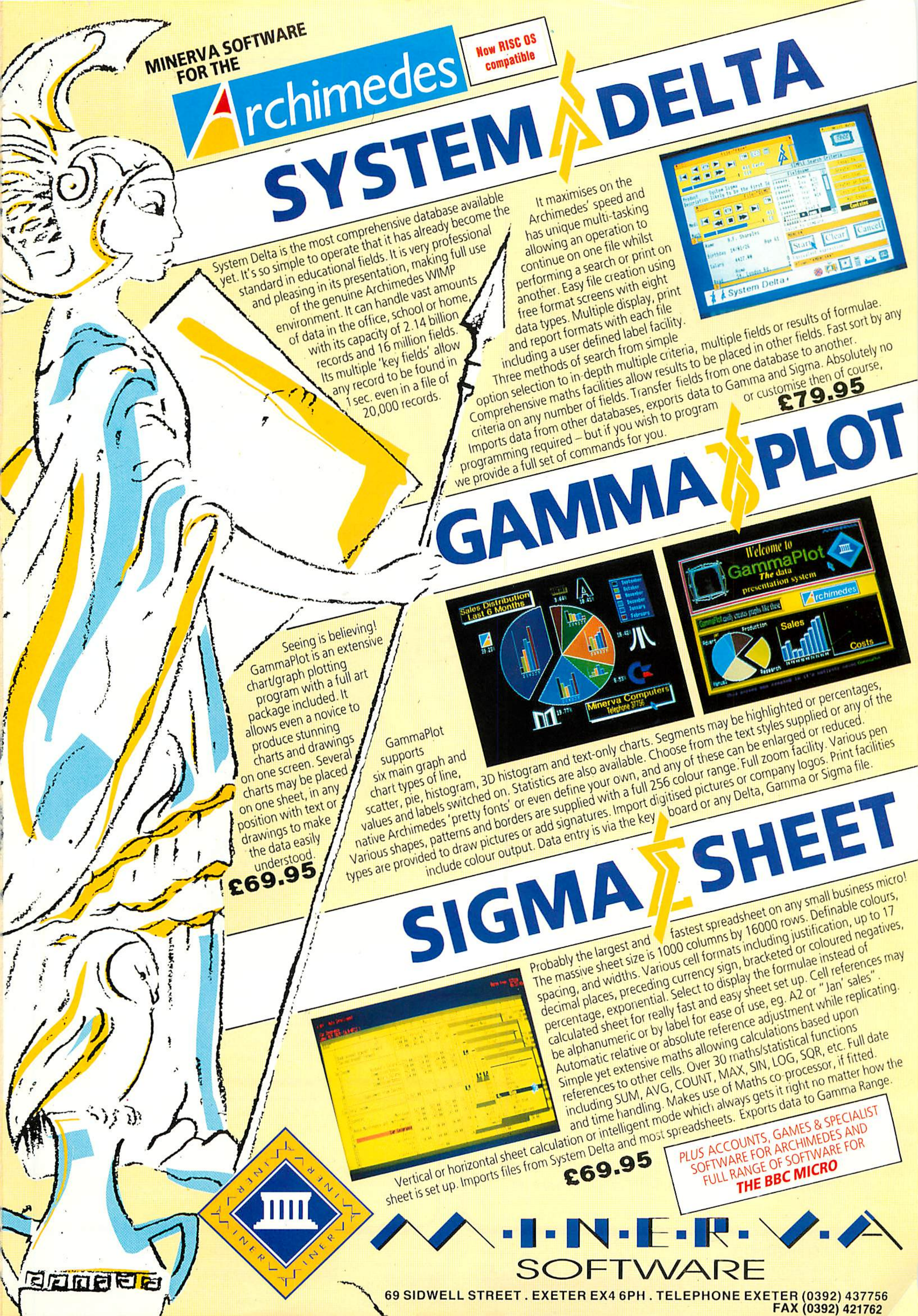
■ Gem Electronics publishes a game called *Word-up, Word-down*. It may, or may not, be a winner. We can't tell. Despite all efforts in the office, we couldn't get it to run. The strange thing is that the 'hidden' bonus game (which is to save the leaping yuppies), still works fine.

■ Star Micronics almost merits a Tony award this month. Receiving a package in the post, we were pleased to see its latest new printer was packed with a super free gift – a helium balloon. Great fun. But Star failed to win a Tony because there was no printer. It had mailed us a balloon in a box – to publicise its sponsorship of a forthcoming aeronautical event.

Who do you know in Cambridge?

At least four software writers are putting together a *Hypertext* system for the Archimedes. *Hypertext* is a way of cross-referencing information, so if you want further details on something, you just click on it with the mouse. This brings up the details, or leads to other related items – perhaps a picture to explain a difficult concept.

But if you are trying to interest software houses in your program, and it's only one of three, what's the best way of standing out from the herd? One bright idea is to create an example bit of *Hypertext* – perhaps one of the 'Cambridge phenomenon' (all the whizz-kids and the mass of new hi-tech companies that have set up in the area). And this way, everyone you are trying to sell it to is actually in the story (and given the rapid job swaps in Cambridge, probably several times)! Brilliant.


MINERVA SOFTWARE FOR THE
Archimedes
Now RISC OS compatible
SYSTEM DELTA
System Delta is the most comprehensive database available yet. It's so simple to operate that it has already become the standard in educational fields. It is very professional and pleasing in its presentation, making full use of the genuine Archimedes WIMP environment. It can handle vast amounts of data in the office, school or home, with its capacity of 2.14 billion records and 16 million fields. Its multiple 'key fields' allow any record to be found in 1 sec. even in a file of 20,000 records.
It maximises on the Archimedes' speed and has unique multi-tasking allowing an operation to continue on one file whilst performing a search or print on another. Easy file creation using free format screens with eight data types. Multiple display, print and report formats with each file including a user defined label facility.
Three methods of search from simple option selection to in-depth multiple criteria, multiple fields or results of formulae. Comprehensive maths facilities allow results to be placed in other fields. Fast sort by any criteria on any number of fields. Transfer fields from one database to another. Imports data from other databases, exports data to Gamma and Sigma. Absolutely no programming required – but if you wish to program or customise then of course, we provide a full set of commands for you.
£79.95
System Delta
Start
Clear
Cancel
GAMMA PLOT
Seeing is believing! GammaPlot is an extensive chart/graph plotting program with a full art package included. It allows even a novice to produce stunning charts and drawings on one screen. Several charts may be placed on one sheet, in any position with text or drawings to make the data easily understood.
£69.95
GammaPlot supports six main graph and chart types of line, scatter, pie, histogram, 3D histogram and text-only charts. Segments may be highlighted or percentages, values and labels switched on. Statistics are also available. Choose from the text styles supplied or any of the native Archimedes 'pretty fonts' or even define your own, and any of these can be enlarged or reduced. Various shapes, patterns and borders are supplied with a full 256 colour range. Full zoom facility. Various pen types are provided to draw pictures or add signatures. Import digitised pictures or company logos. Print facilities include colour output. Data entry is via the keyboard or any Delta, Gamma or Sigma file.
Sales Distribution Last 6 Months
Minerva Computers
Welcome to GammaPlot
The data presentation system
Archimedes
Production
Sales
Costs
Research
SIGMA SHEET
Probably the largest and fastest spreadsheet on any small business micro! The massive sheet size is 1000 columns by 16000 rows. Definable colours, spacing, and widths. Various cell formats including justification, up to 17 decimal places, preceding currency sign, bracketed or coloured negatives, percentage, exponential. Select to display the formulae instead of calculated sheet for really fast and easy sheet set up. Cell references may be alphanumeric or by label for ease of use, eg. A2 or "Jan' sales". Automatic relative or absolute reference adjustment while replicating. Simple yet extensive maths allowing calculations based upon references to other cells. Over 30 maths/statistical functions including SUM, AVG, COUNT, MAX, SIN, LOG, SQR, etc. Full date and time handling. Makes use of Maths co-processor, if fitted. Vertical or horizontal sheet calculation or intelligent mode which always gets it right no matter how the sheet is set up. Imports files from System Delta and most spreadsheets. Exports data to Gamma Range.
£69.95
PLUS ACCOUNTS, GAMES & SPECIALIST SOFTWARE FOR ARCHIMEDES AND FULL RANGE OF SOFTWARE FOR THE BBC MICRO
MINERVA SOFTWARE
69 SIDWELL STREET . EXETER EX4 6PH . TELEPHONE EXETER (0392) 437756
FAX (0392) 421762











PLAY IT AGAIN SAM 7 for the BBC Micro and Acorn Electron

Superior Software has combined three classic hits from other software houses (one new to the Electron) with one of its own top hits. The result is a top quality four-game compilation that combines variety with great value for money.

BBC Micro Cassette	£9.95	Acorn Electron Cassette	£9.95
BBC Micro 5¼" Disc	£11.95	BBC Master Compact 3½" Disc	£14.95

(Compatible with the BBC B, B+ and Master Series computers)

Please make cheques payable to "Superior Software Ltd".

(The screen pictures show the BBC Micro versions of the games.)

PLAY IT AGAIN SAM COMPETITION

Each copy of Play It Again Sam 7 contains a PLAY IT AGAIN SAM COMPETITION card.

Answer some straightforward questions on the card about previous Play It Again Sam compilations, and suggest possible games for future compilations, and you may be one of ten prizewinners.

Each prizewinner will receive all the previous Play It Again Sam compilations, or any other six games of his/her choice from the Superior Software BBC/Electron catalogue, and in addition will receive all future Play It Again Sam compilations on the day of release.

SUPERIOR SOFTWARE Limited

ACORNSOFT

Available from WHSMITH and all major dealers




24 HOUR TELEPHONE ANSWERING SERVICE FOR ORDERS

OUR GUARANTEE

- All mail orders are despatched within 24 hours by first-class post.
- Postage and packing is free.
- Faulty cassettes and discs will be replaced immediately.

(This does not affect your statutory rights)

(Acornsoft is a registered trademark of Acorn Computers Ltd. Superior Software Ltd is a registered user.)

Dept 7PS1, Regent House, Skinner Lane, Leeds LS7 1AX. Telephone:(0532) 459453